

Fig.1A
(PRIOR ART)



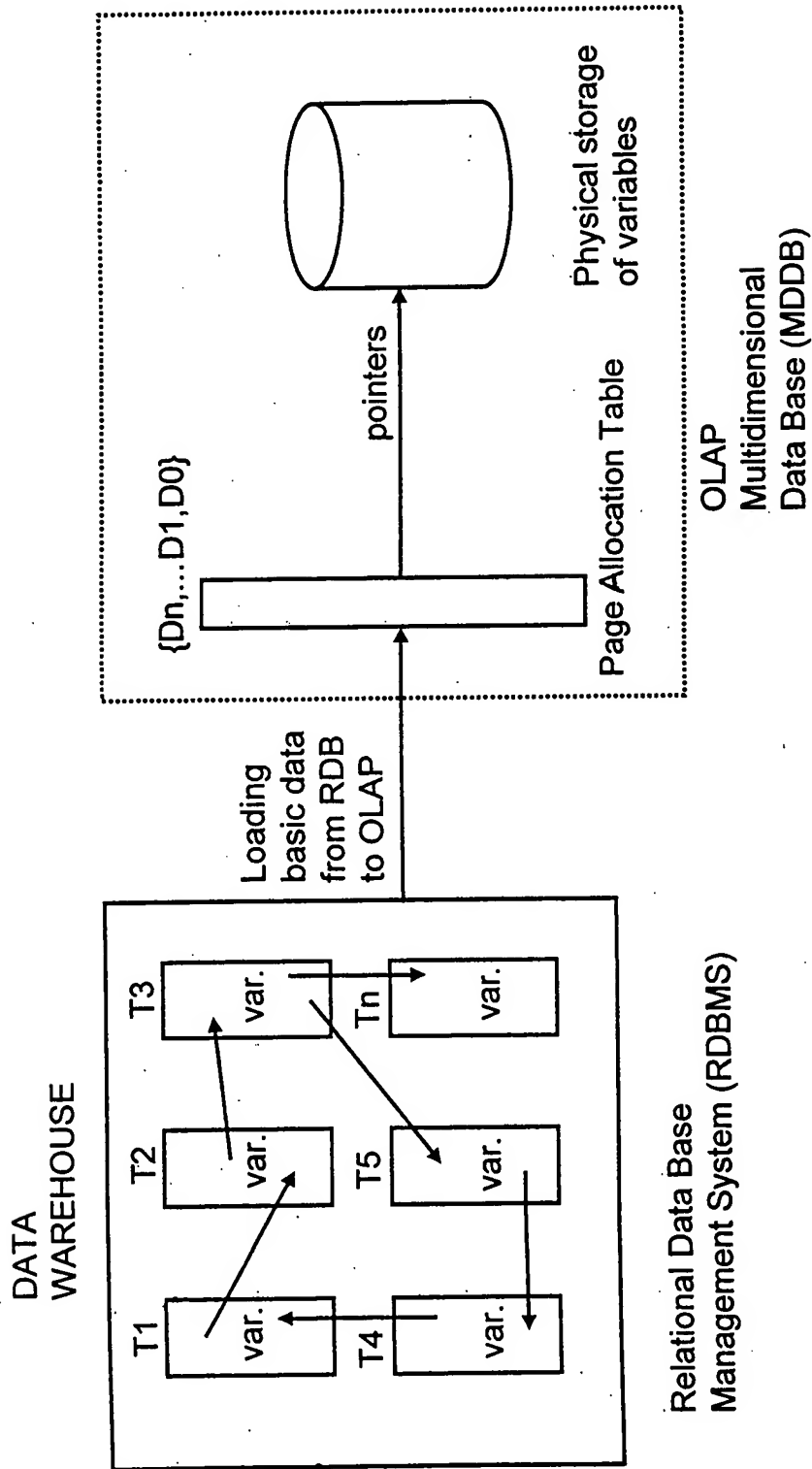
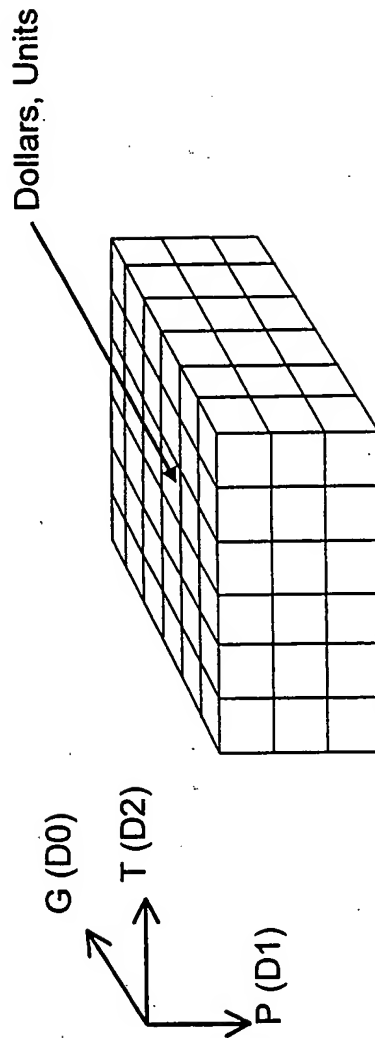


Fig. 2A
(PRIOR ART)



- G geography (e.g. cities, states, countries, continents)
- T time (e.g., days, weeks, months, years)
- P products (e.g. all products, by manufacturer)

Fig. 2B
(PRIOR ART)

Array structure of a multidimensional variable

		D0					
		0	1	2	3	4	5
D2=0	D1= 0						
	D1= 1						
	D1= 2						
D2=1	D1= 0						
	D1= 1						
	D1= 2						
D2=2	D1= 0						
	D1= 1						
	D1= 2						
D2=3	D1= 0						
	D1= 1						
	D1= 2						
D2=3	D1= 0						
	D1= 1						
	D1= 2						

Fig. 2C
(PRIOR ART)

Page Allocation Table pointing on physical records of a multidimensional variable (e.g. the two first rows of a variable of FIG. 2B reside in page # 0)

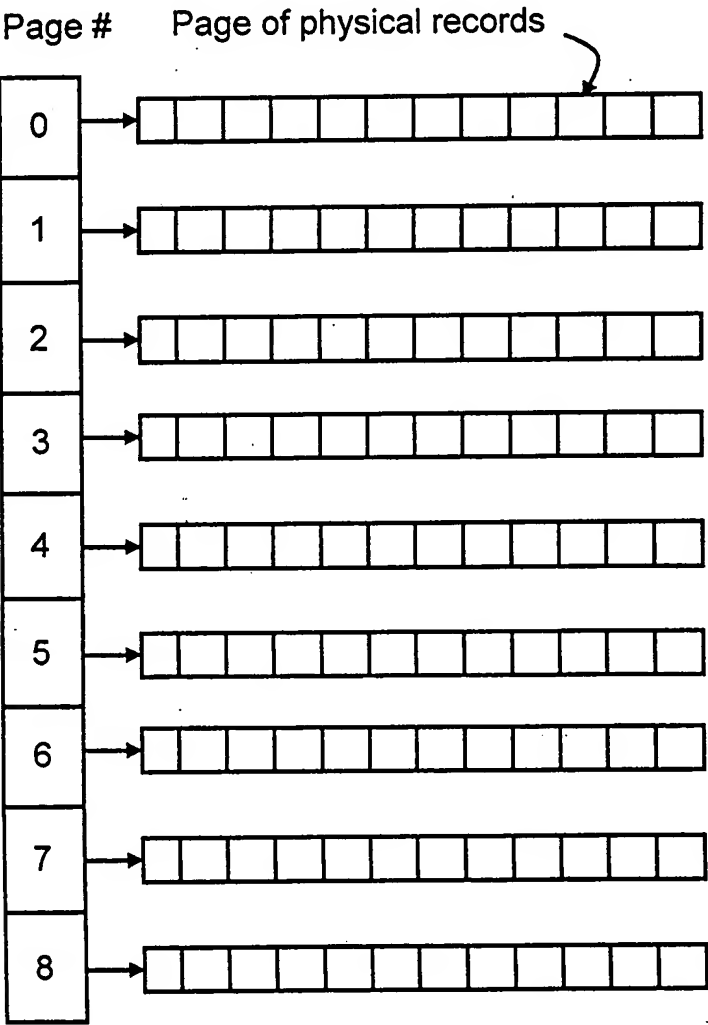


Fig. 2D
(PRIOR ART)

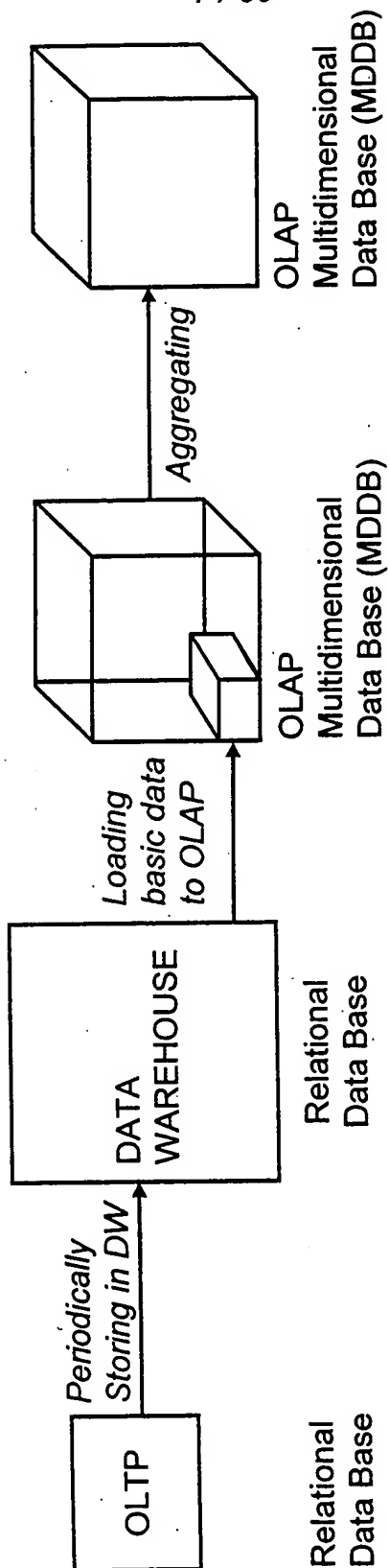


Fig. 3A
(PRIOR ART)

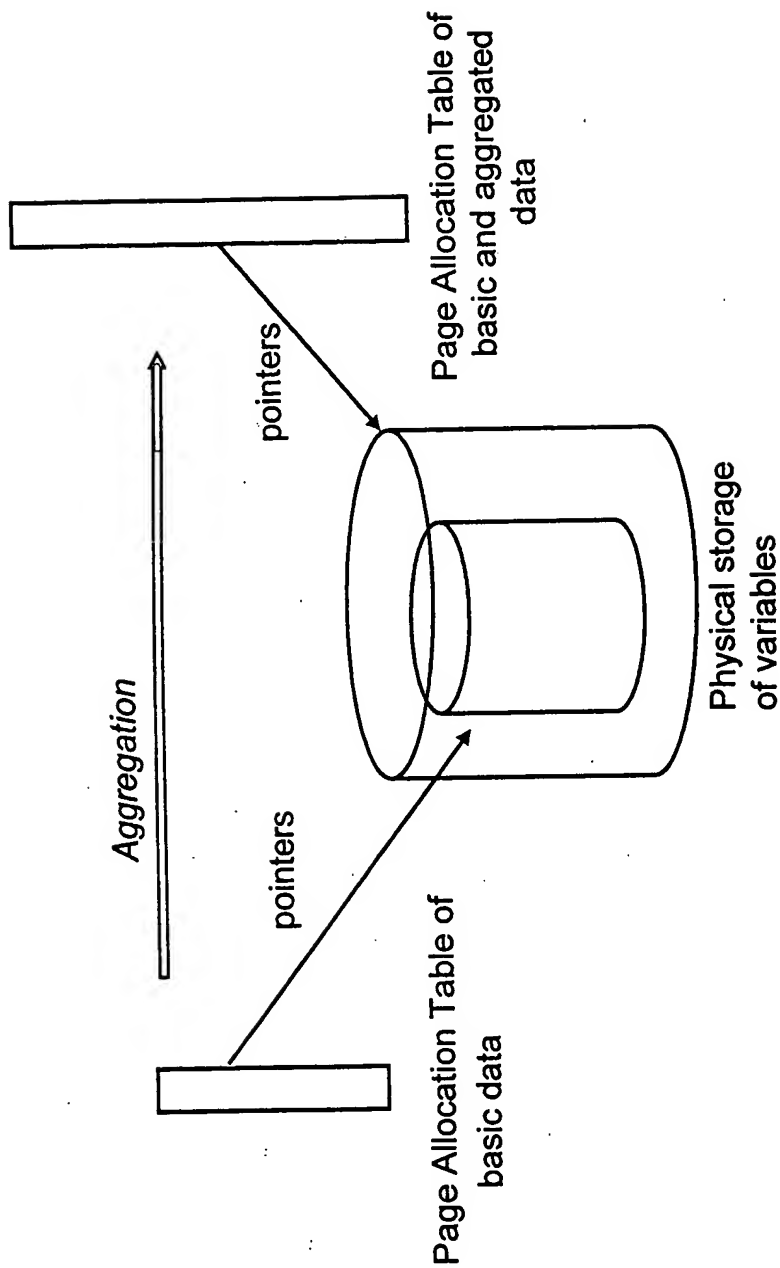


Fig. 3B
(PRIOR ART)

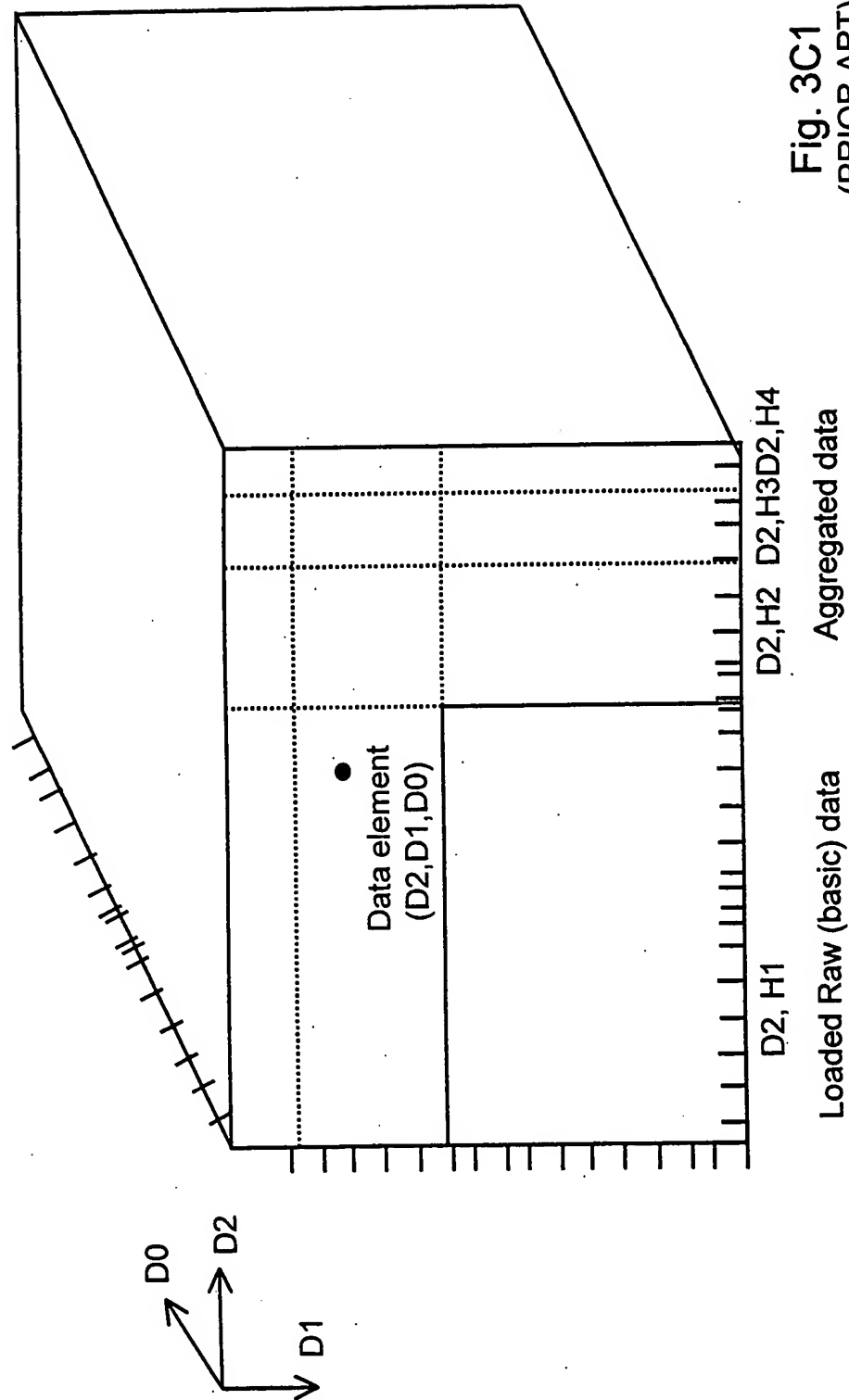


Fig. 3C1
(PRIOR ART)

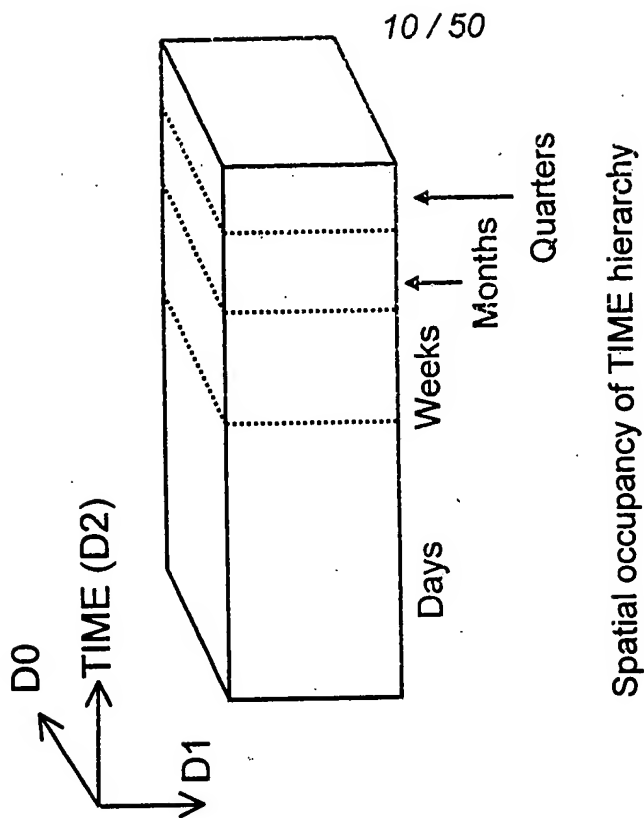


Fig. 3C3
(PRIOR ART)

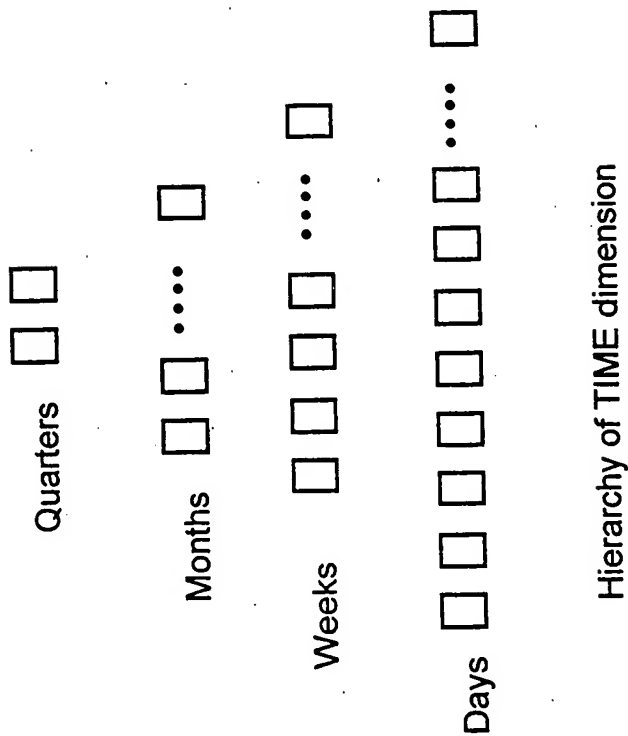


Fig. 3C2
(PRIOR ART)

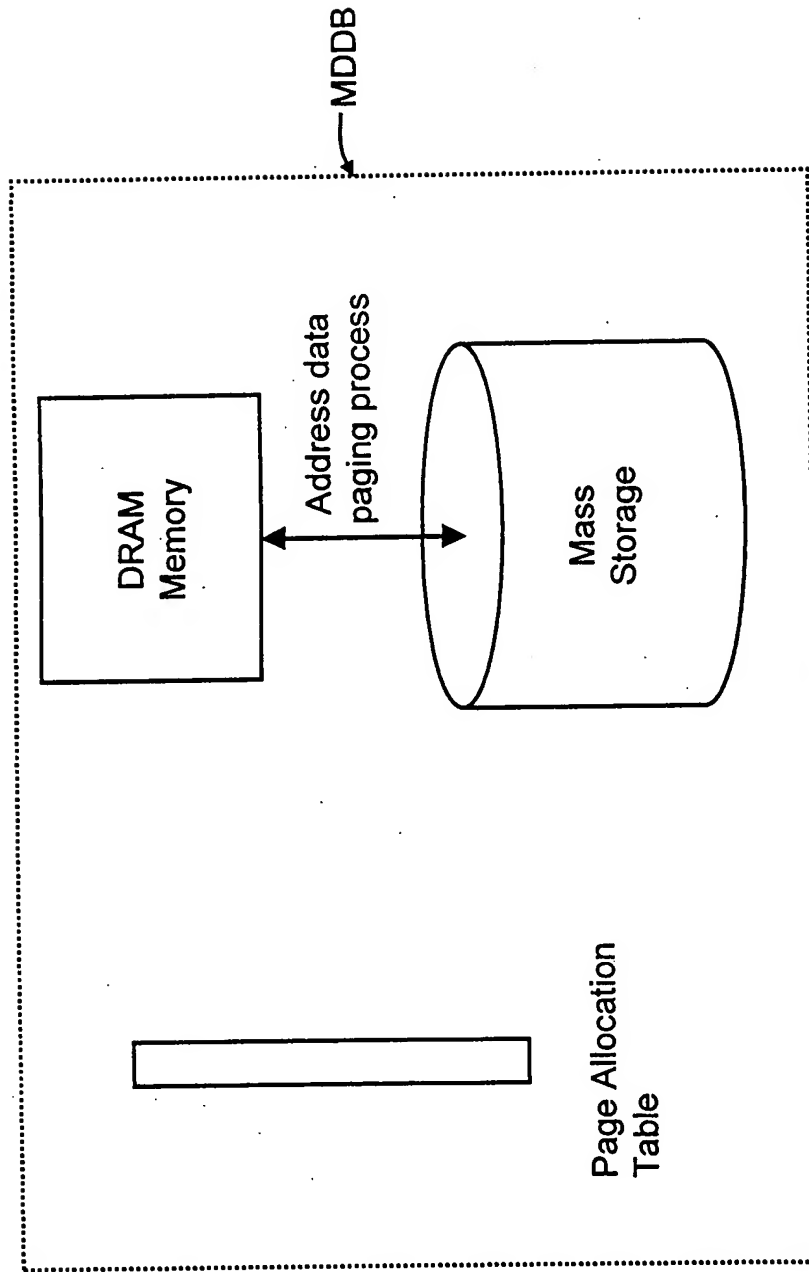


Fig. 4
(PRIOR ART)



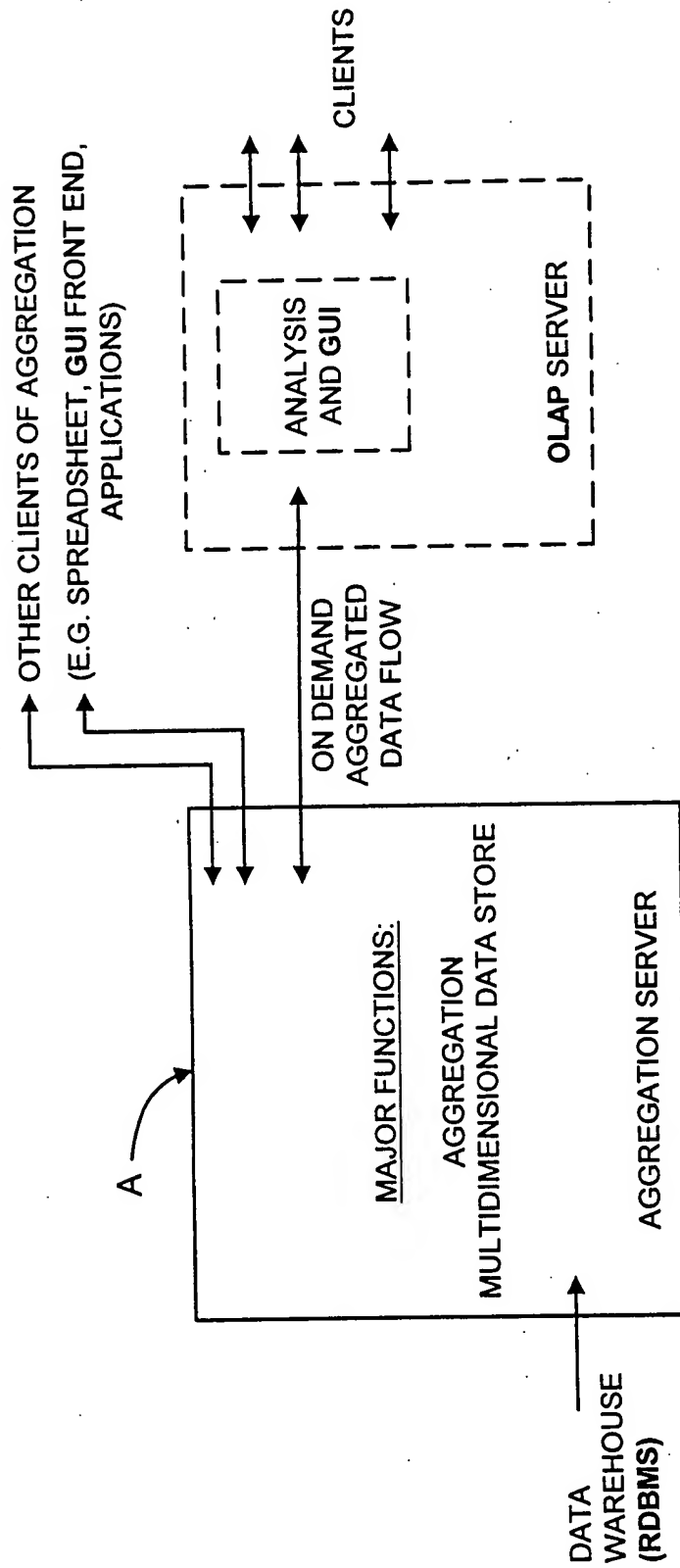


FIG. 6A

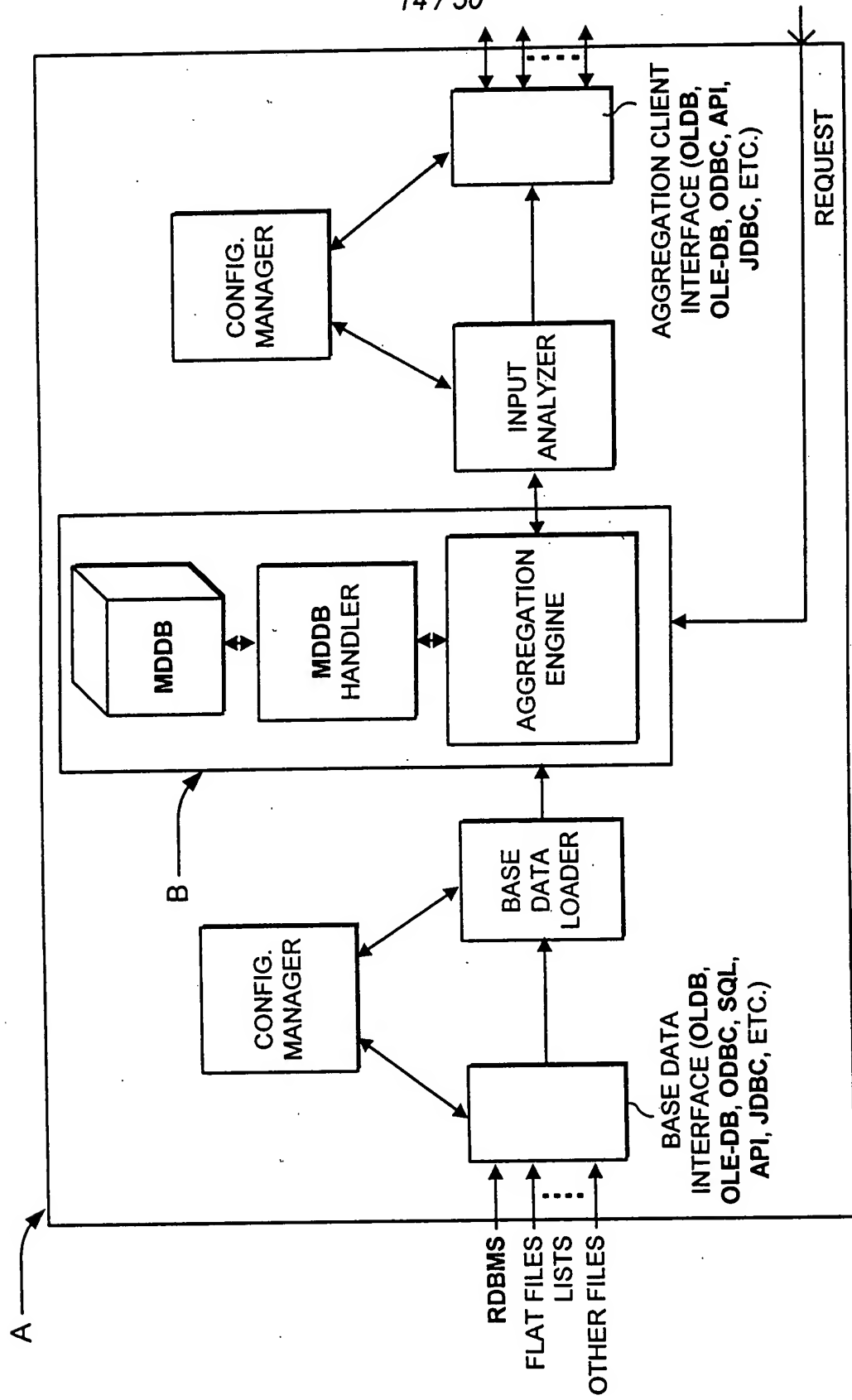


FIG. 6B

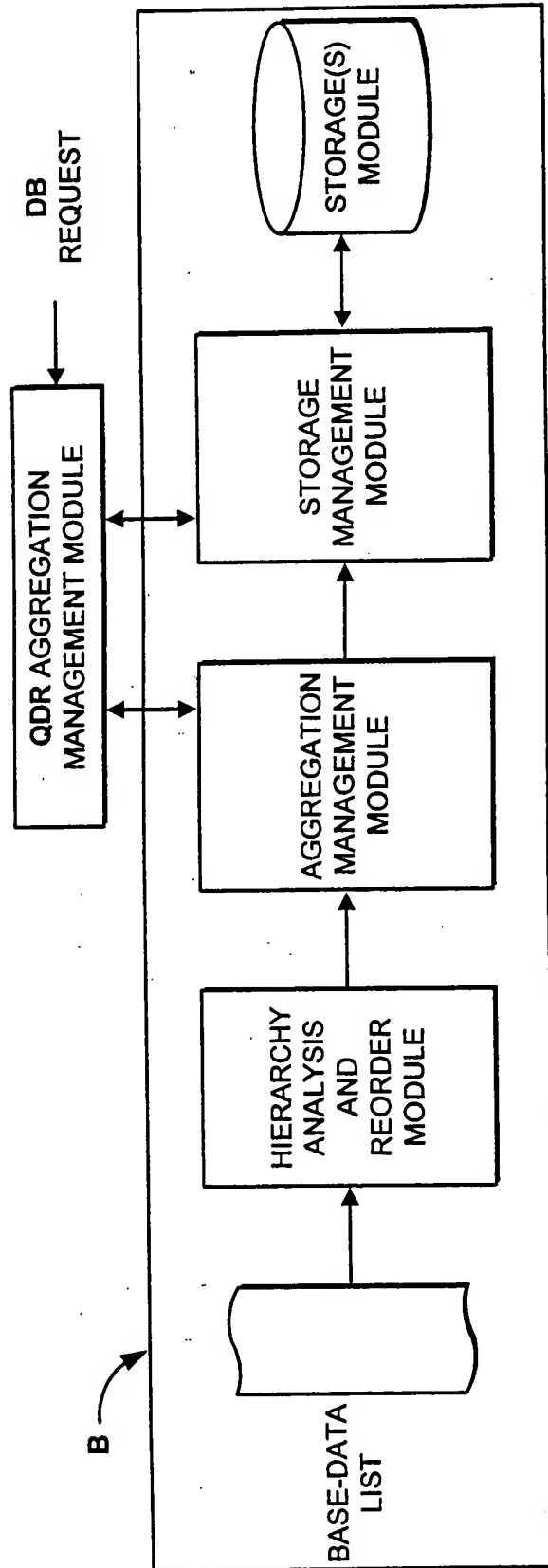


FIG. 6C

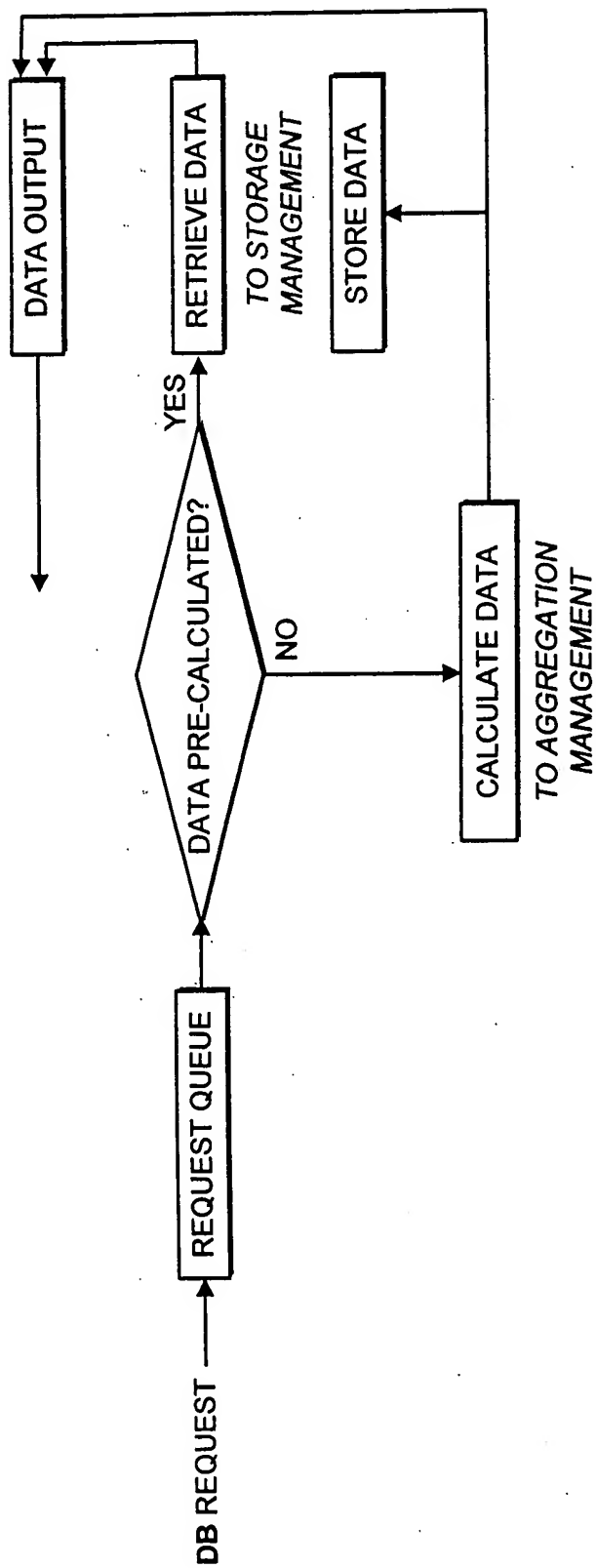


FIG. 6D

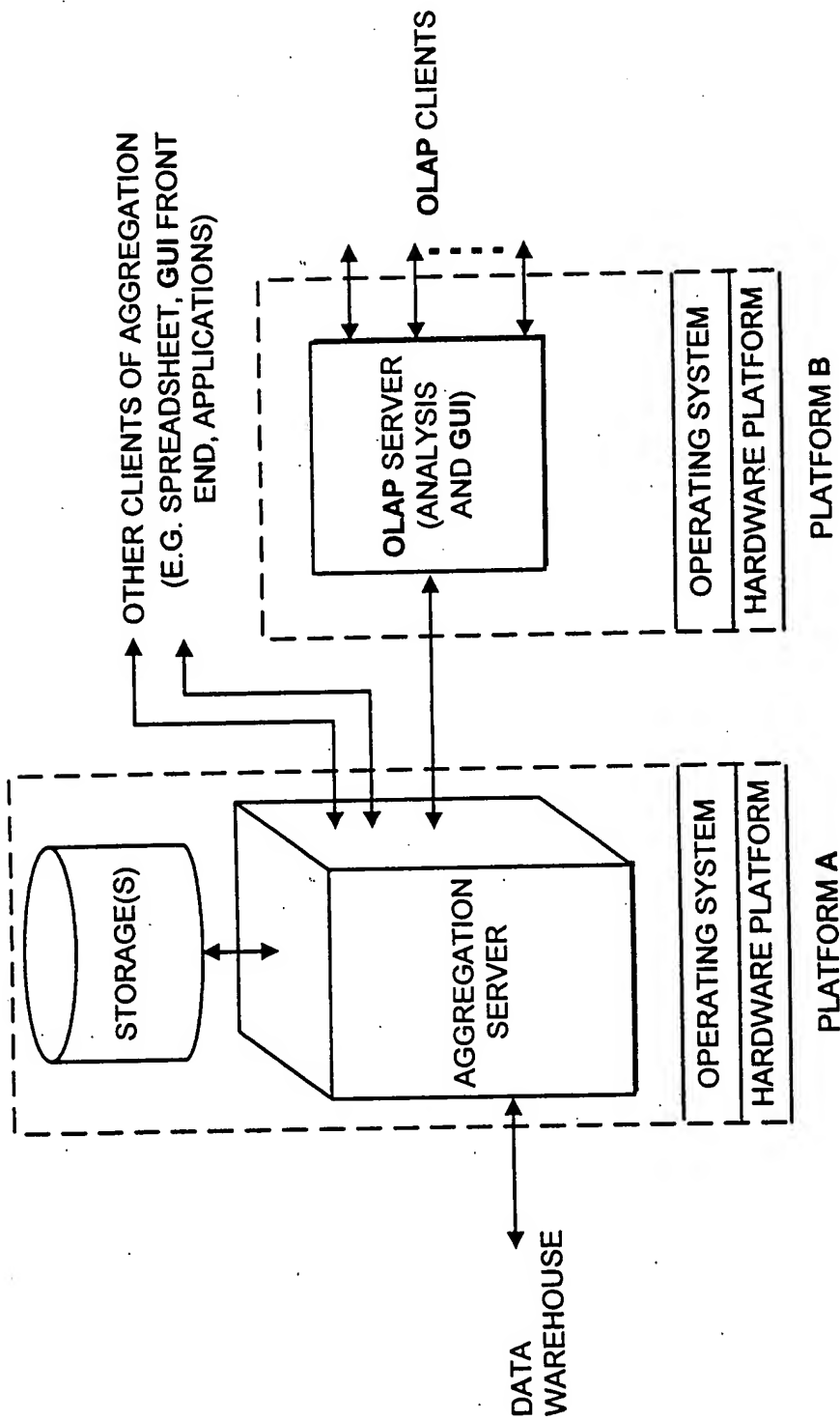


FIG. 7A

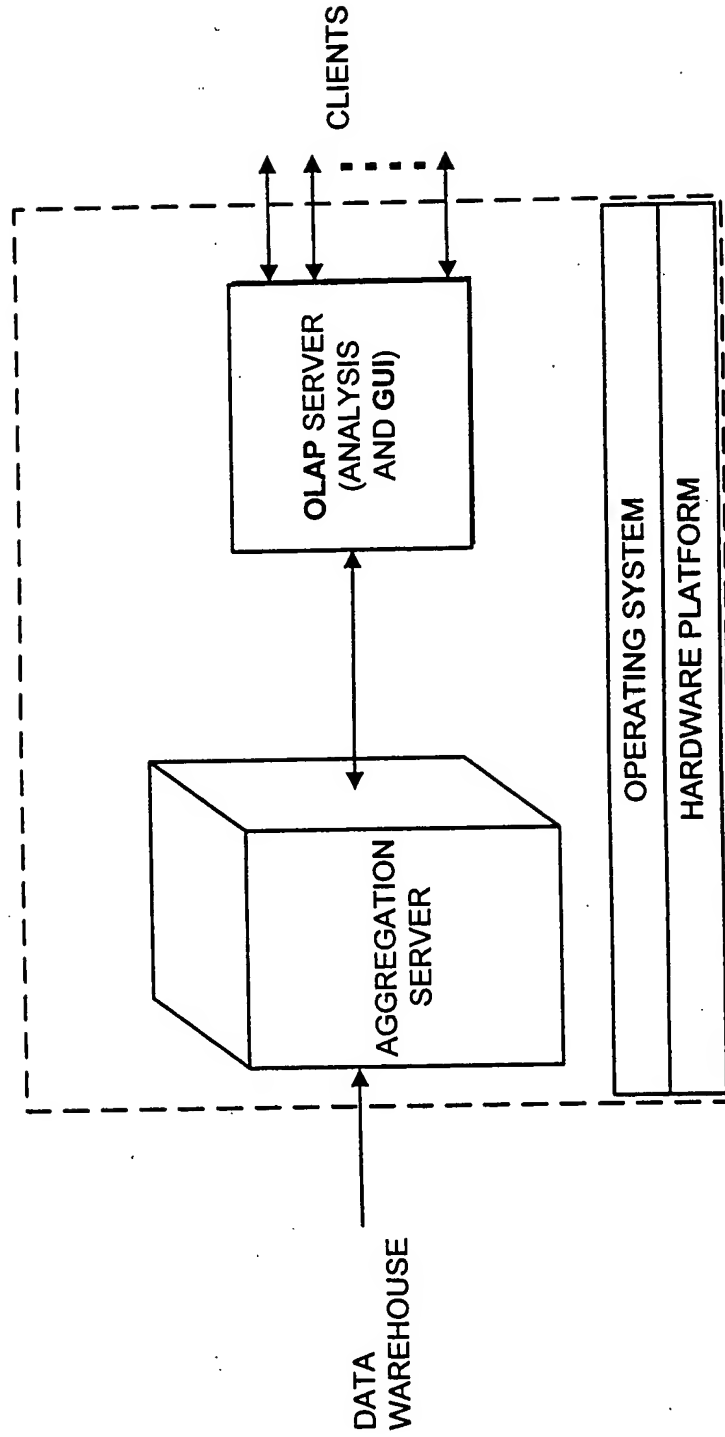


FIG. 7B

	NBR. OF DIM.	NBR. OF ATOMIC DATA DATA VALUES	LEAF NODE DENSITY %	NUMBER OF VALUES IN CUBE AFTER ROLL-UP	ORACLE EXPRESS V. 6.2	IMPLEMENTATION OF CURRENT INVENTION
D1	6	302M	9	427 M	16 h	15 m
D2	4	414M	1.27	969 M	50 m	5 m
D3	5	14,499M	0.03	63,954 M	31 h	1h 23 m
D4	6	623,494M	$8 * 10^{-4}$	7,930 G	EXCEEDS 48 h	2 h 20 m
D5	6	243,000M	10^{-8}	1,160,000 G	22 h	4 m
D6	4	7M	DEFINED AS 100	19 M	15 m	1 m

FIG. 8A

FIG. 9A

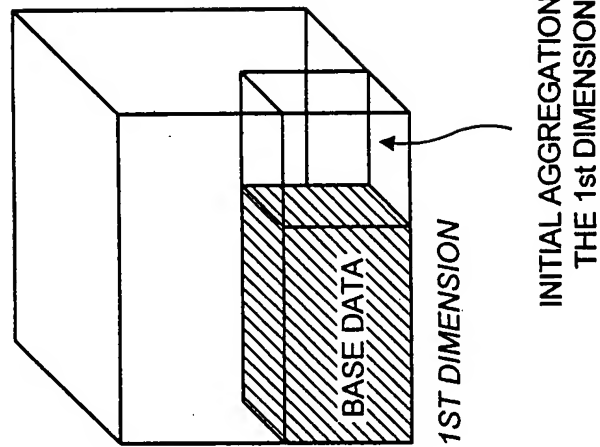
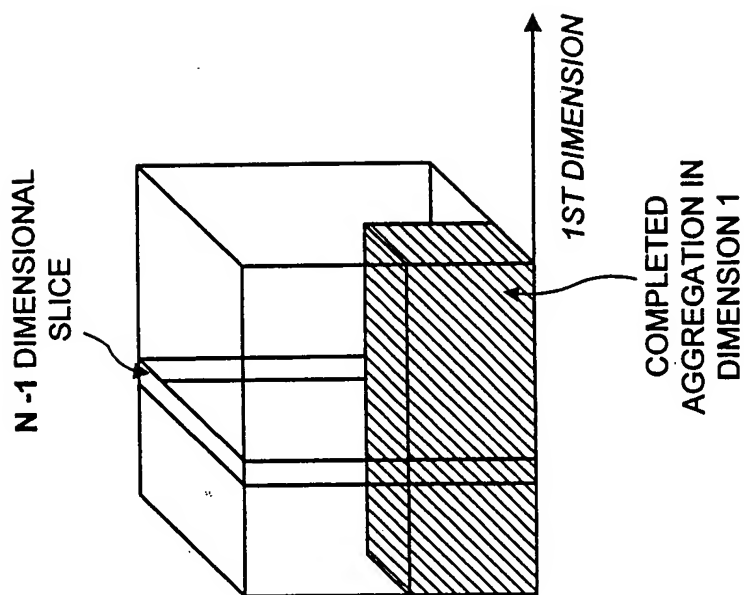
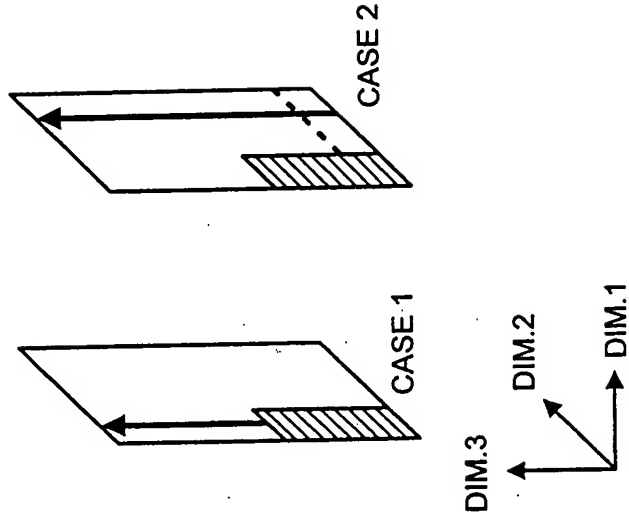


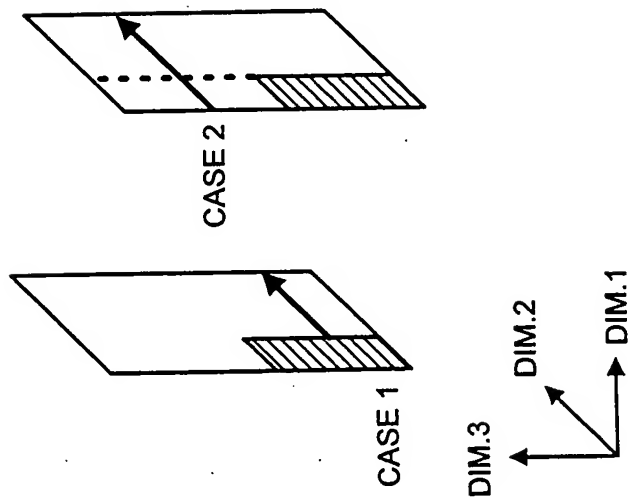
FIG. 9B





A. DIRECTED AGGREGATION IN
DIMENSION 3, CASES 1 AND 2

FIG. 9C2



A. DIRECTED AGGREGATION IN
DIMENSION 2, CASES 1 AND 2

FIG. 9C1

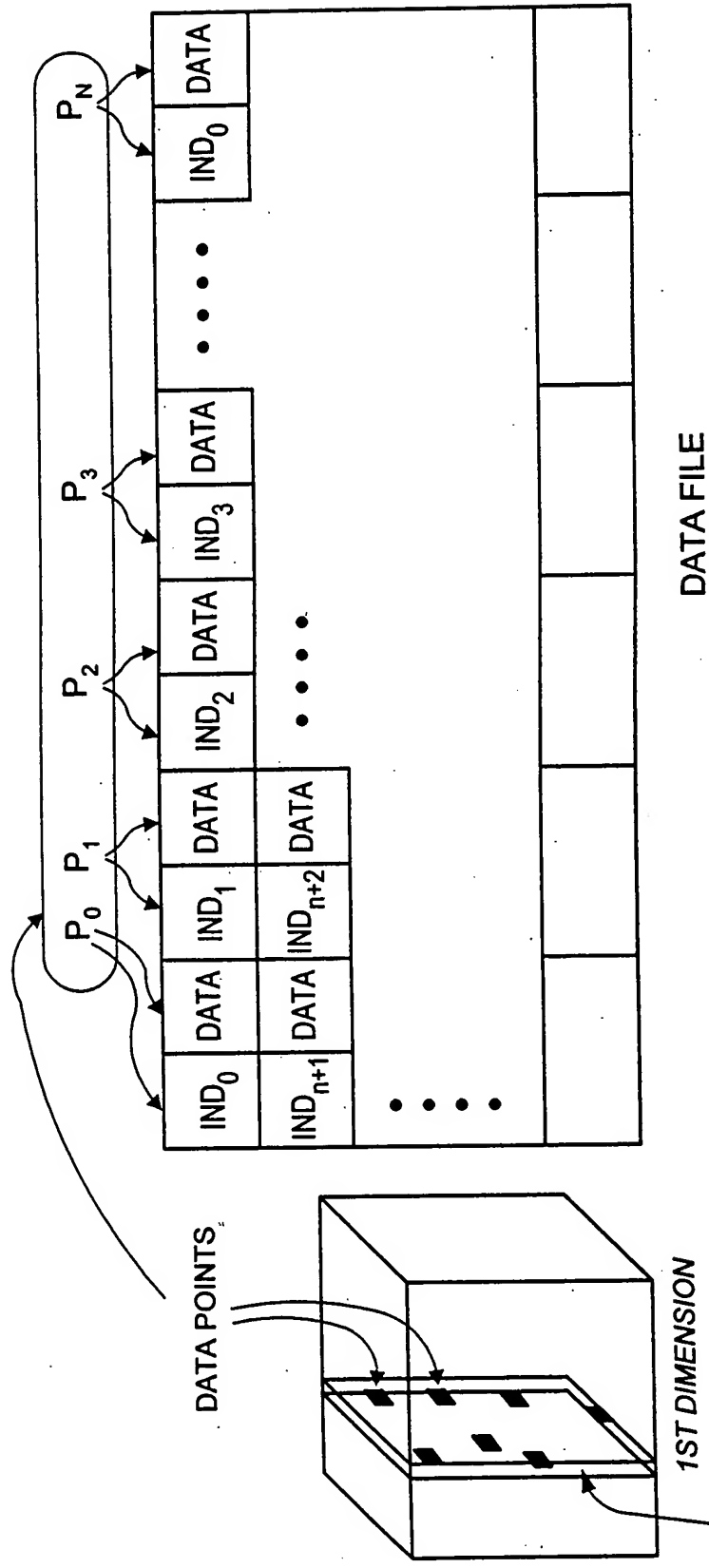


FIG. 10A

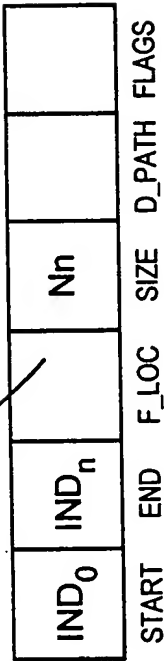
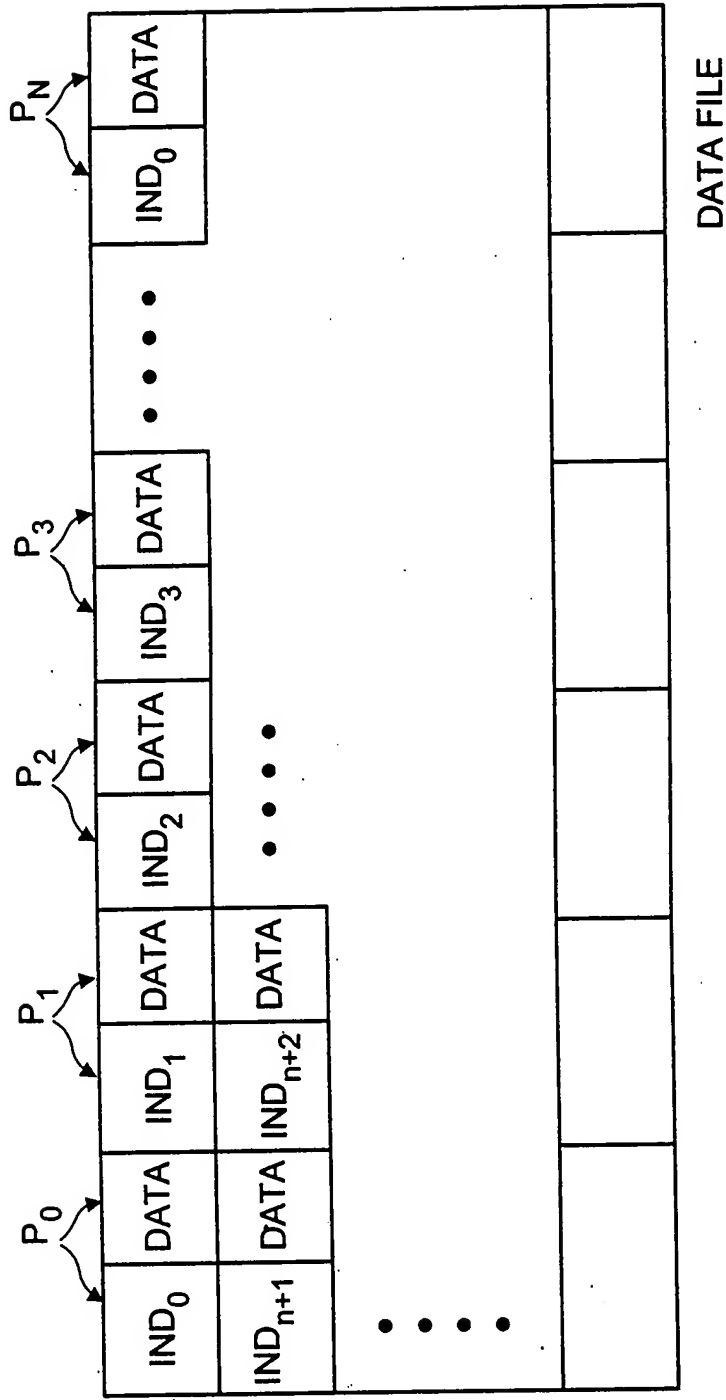
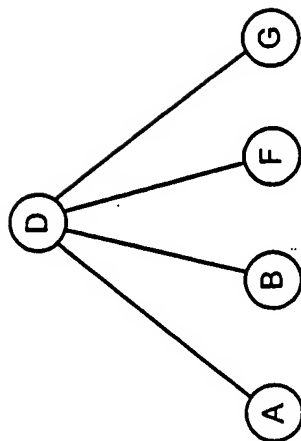
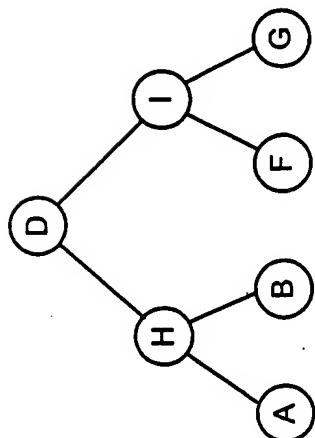


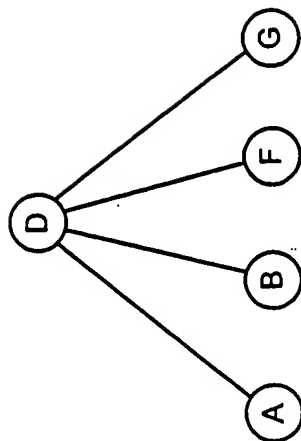
FIG. 10B



STRUCT. 1



STRUCT. 2



STRUCT. 3

FIG. 11A

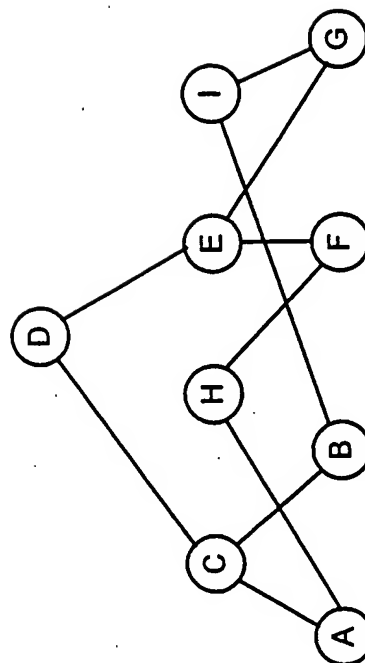


FIG. 11B

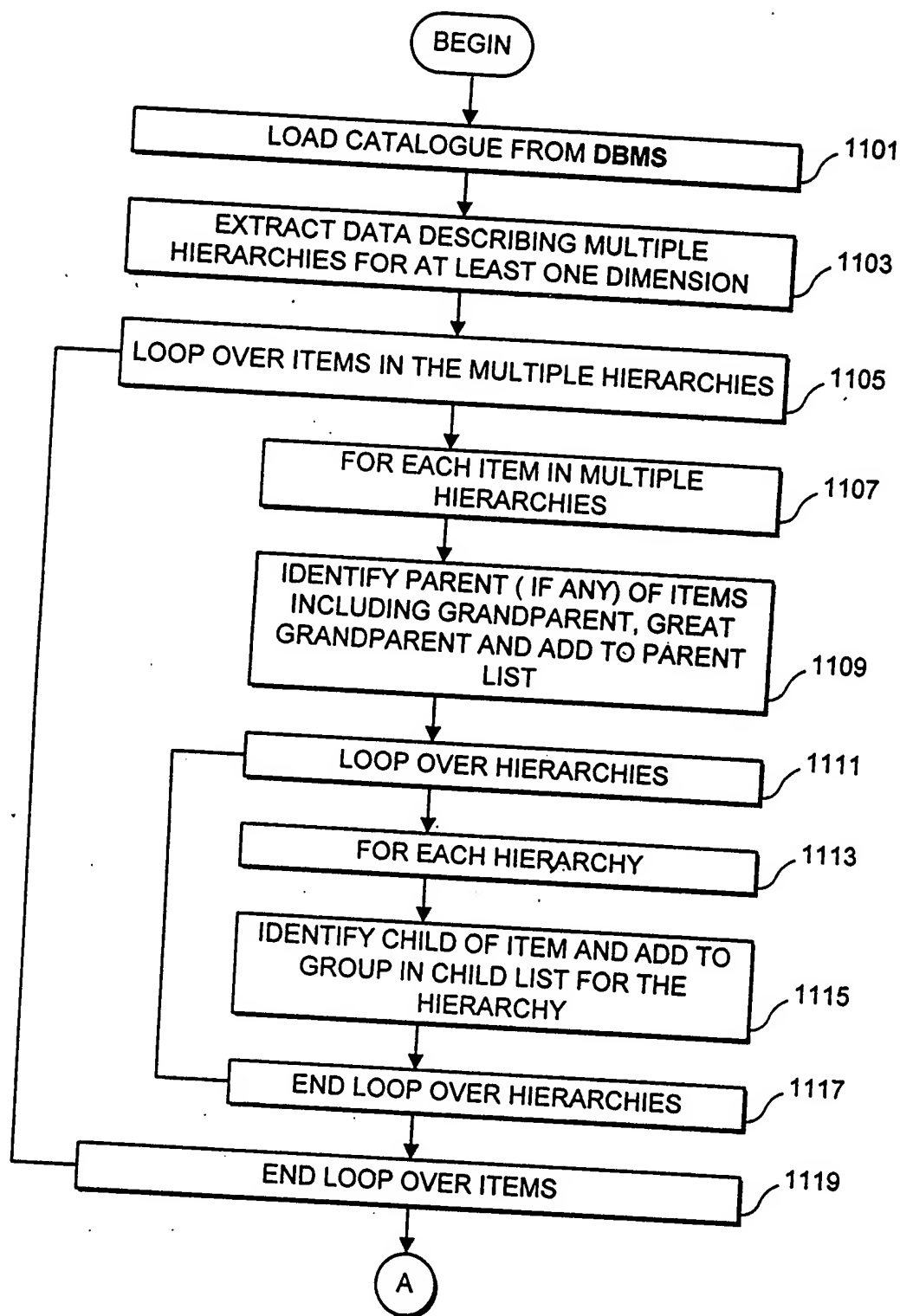


FIG. 11C(i)

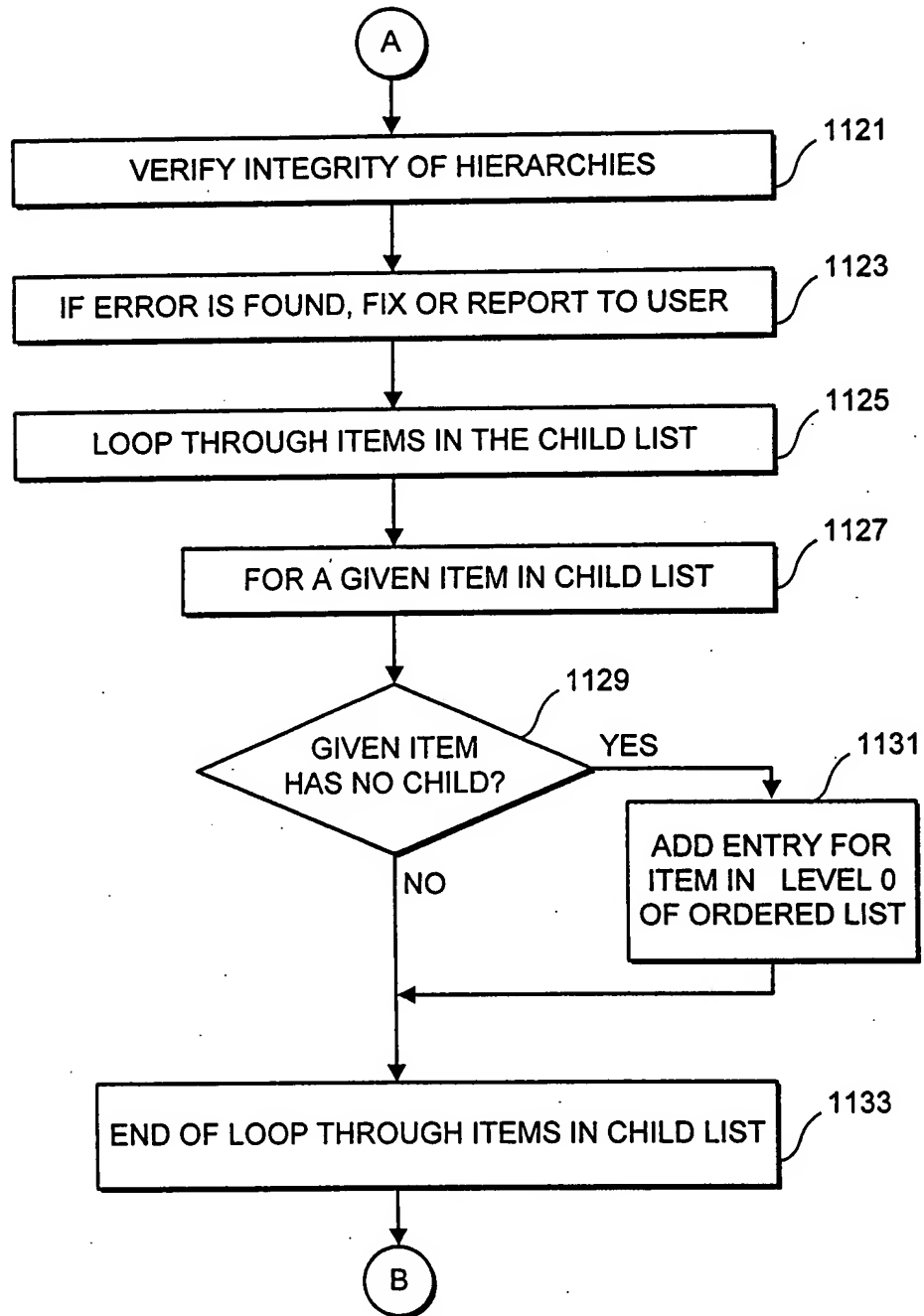


FIG. 11C(ii)

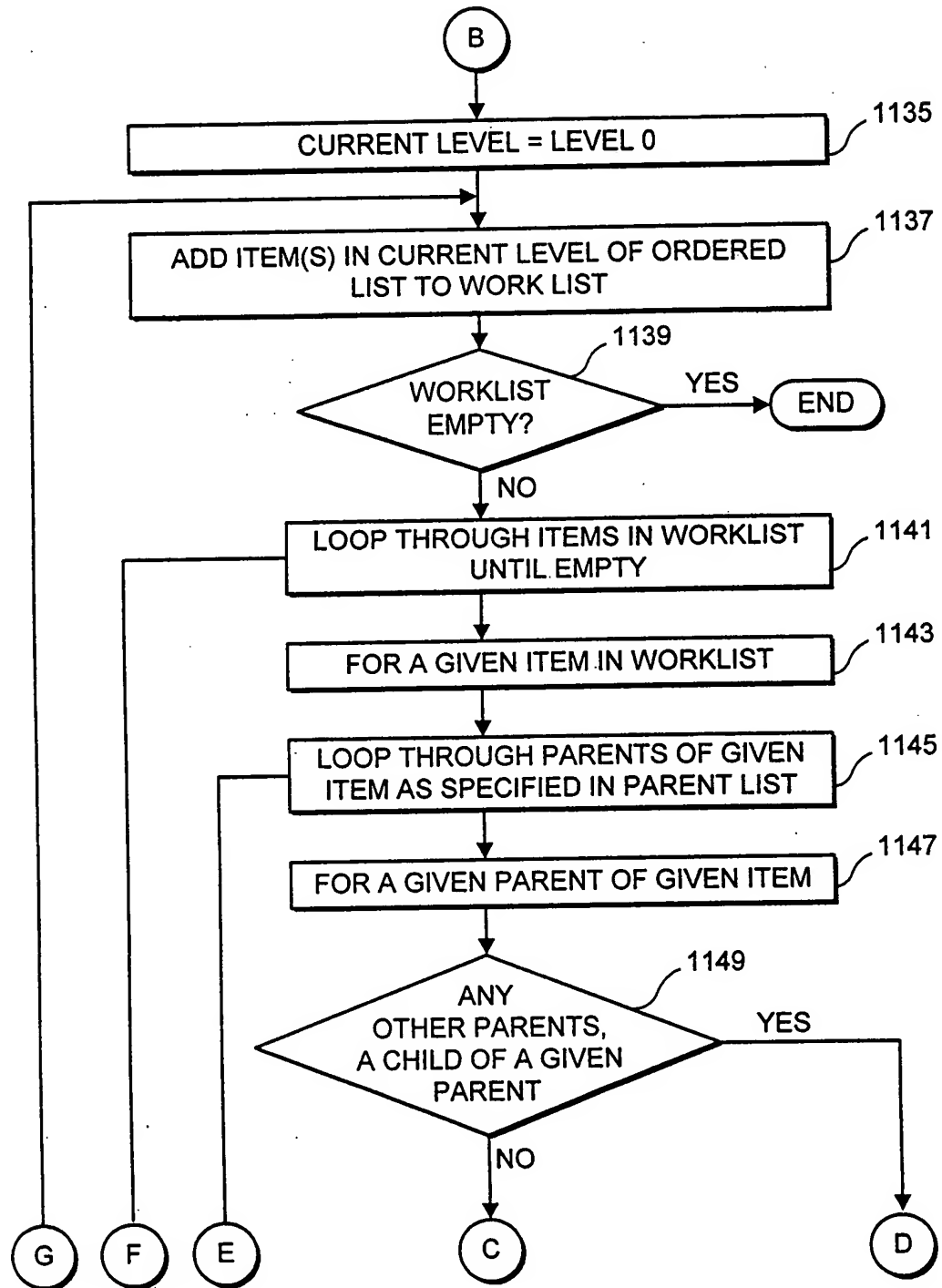


FIG. 11C(iii)

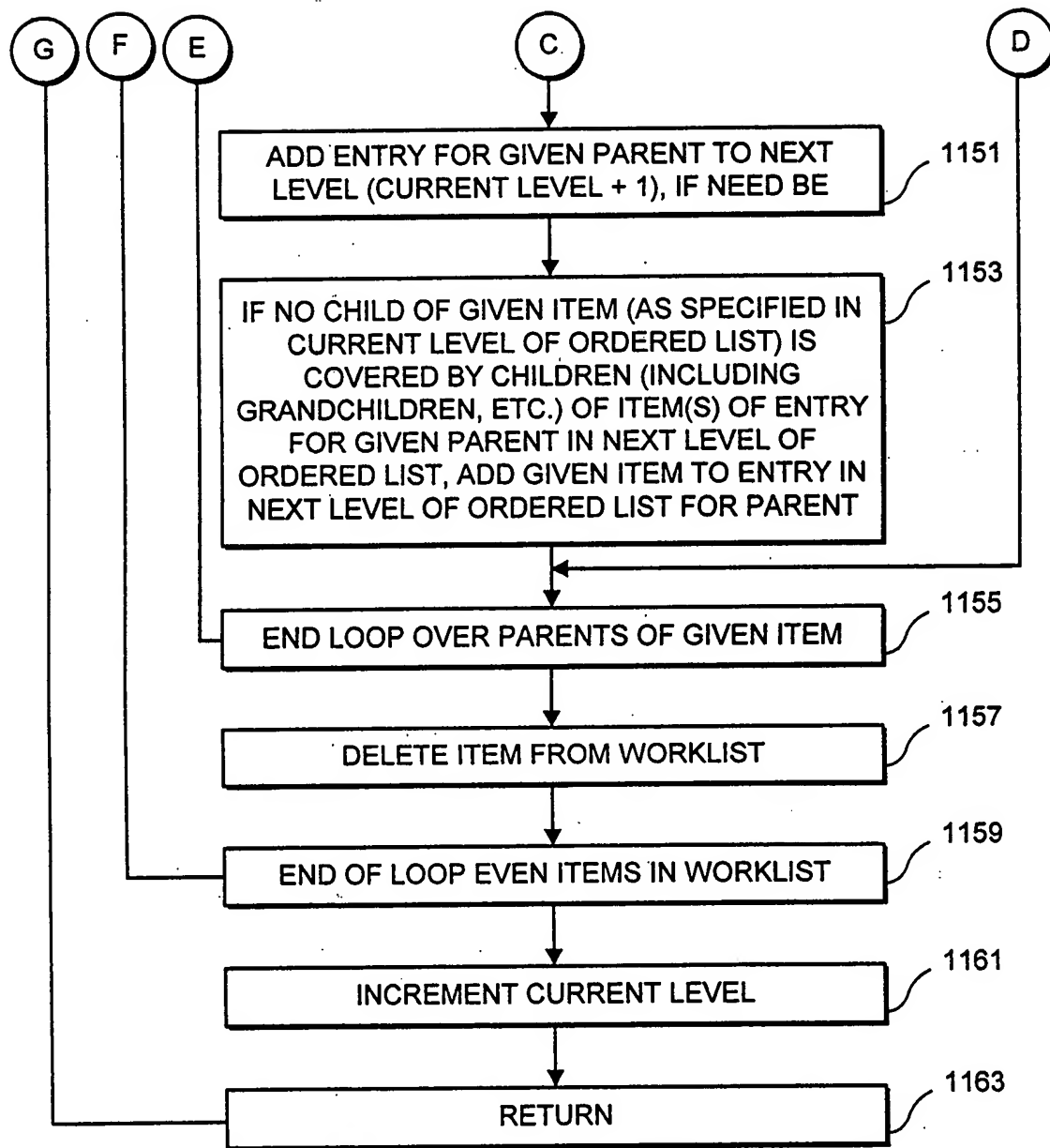


FIG. 11C(iv)

PARENT LIST

ITEM	PARENT(S)
A	C, H, D
B	C, I, D
F	E, H, D
G	E, I, D
C	D
H	D
E	D
I	D
D	—

FIG. 11C(v)

CHILD LIST

ITEM	CHILD(REN)
A	—
B	—
F	—
G	—
C	<A, B>
H	<F, G>
E	<A, F>
I	<B, G>
D	<A, B, F, G>, <H, I>, <C, E>

FIG. 11C(vi)

ORDERED LIST
LEVEL 0

ITEM	CHILD(REN)
A	—
B	—
F	—
G	—

FIG. 11C(vii)

ORDERED LIST
LEVEL 1

ITEM	CHILD(REN)
C	A, B
H	A, F
I	B, G
E	F, G

FIG. 11C(viii)

ORDERED LIST
LEVEL 2

ITEM	CHILD(REN)
D	C, E

FIG. 11C(ix)

AGGREGATION ENGINE
LOADING AND INDEXING MODULE
HIERARCHY TRANSFORMATION MODULE

FIG. 12

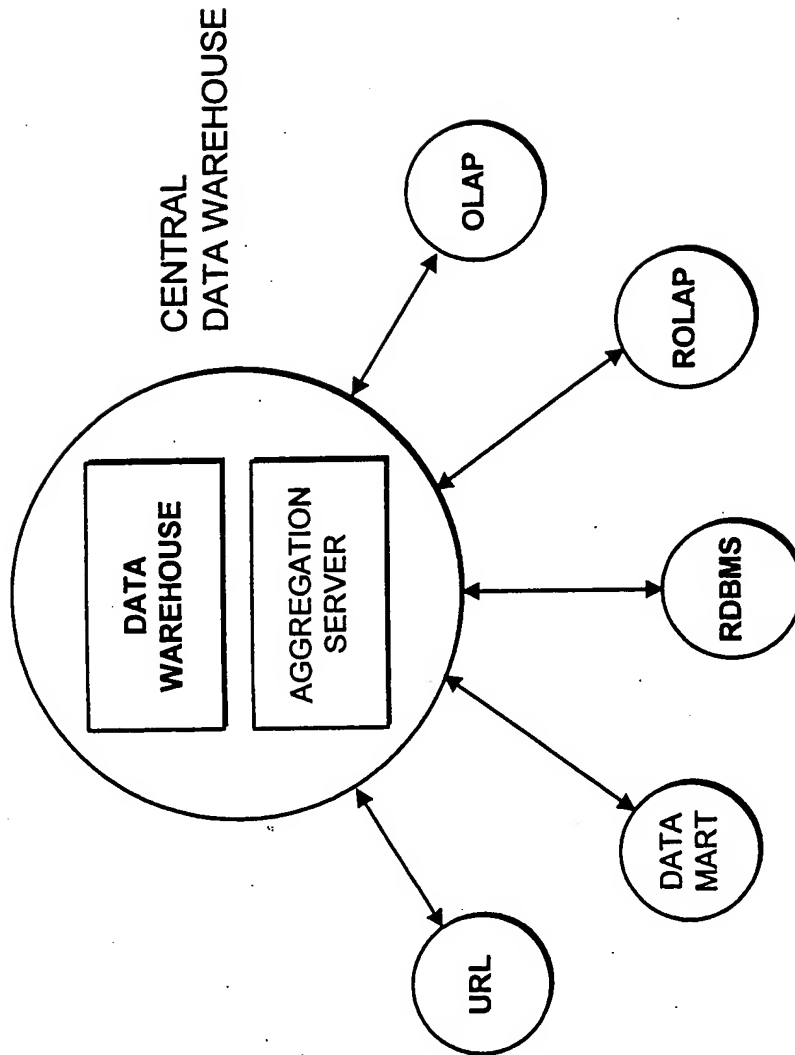


FIG. 13

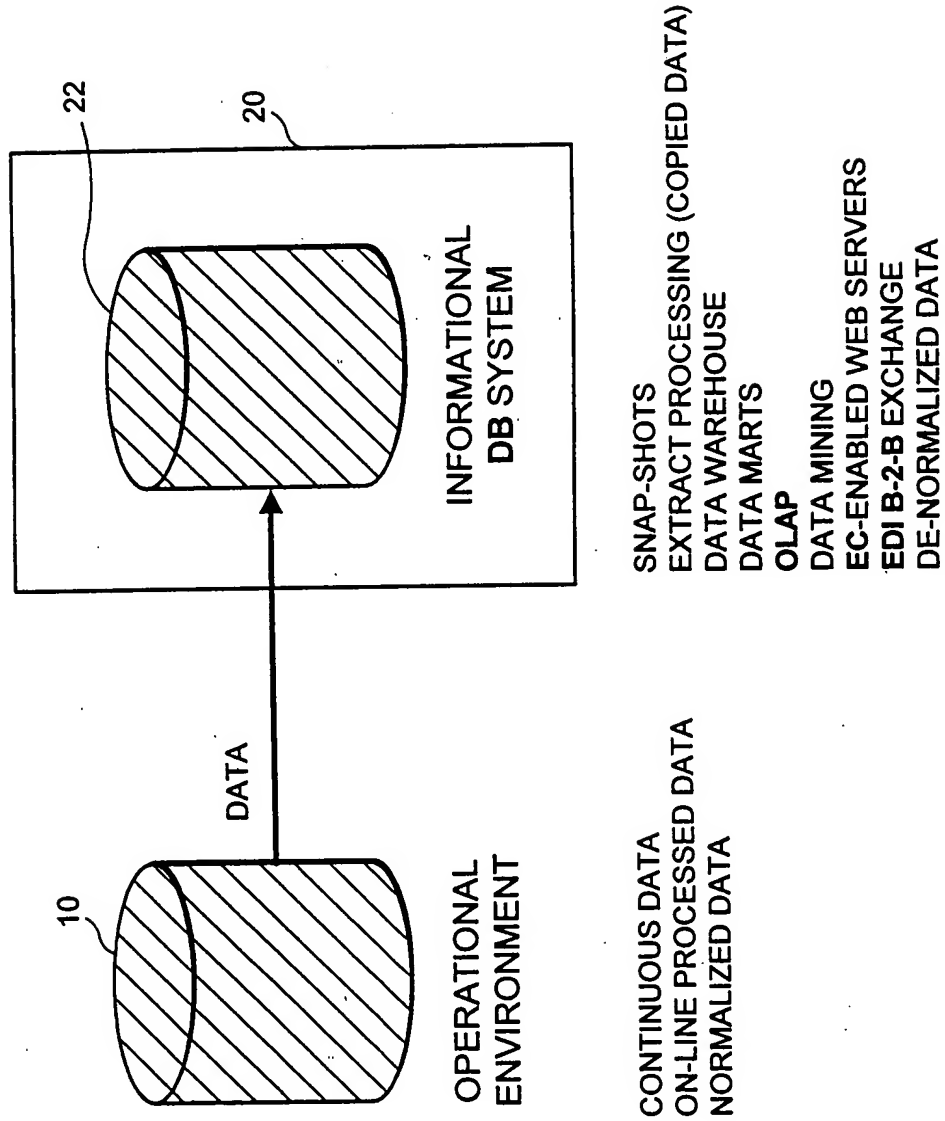


FIG. 14 (PRIOR ART)

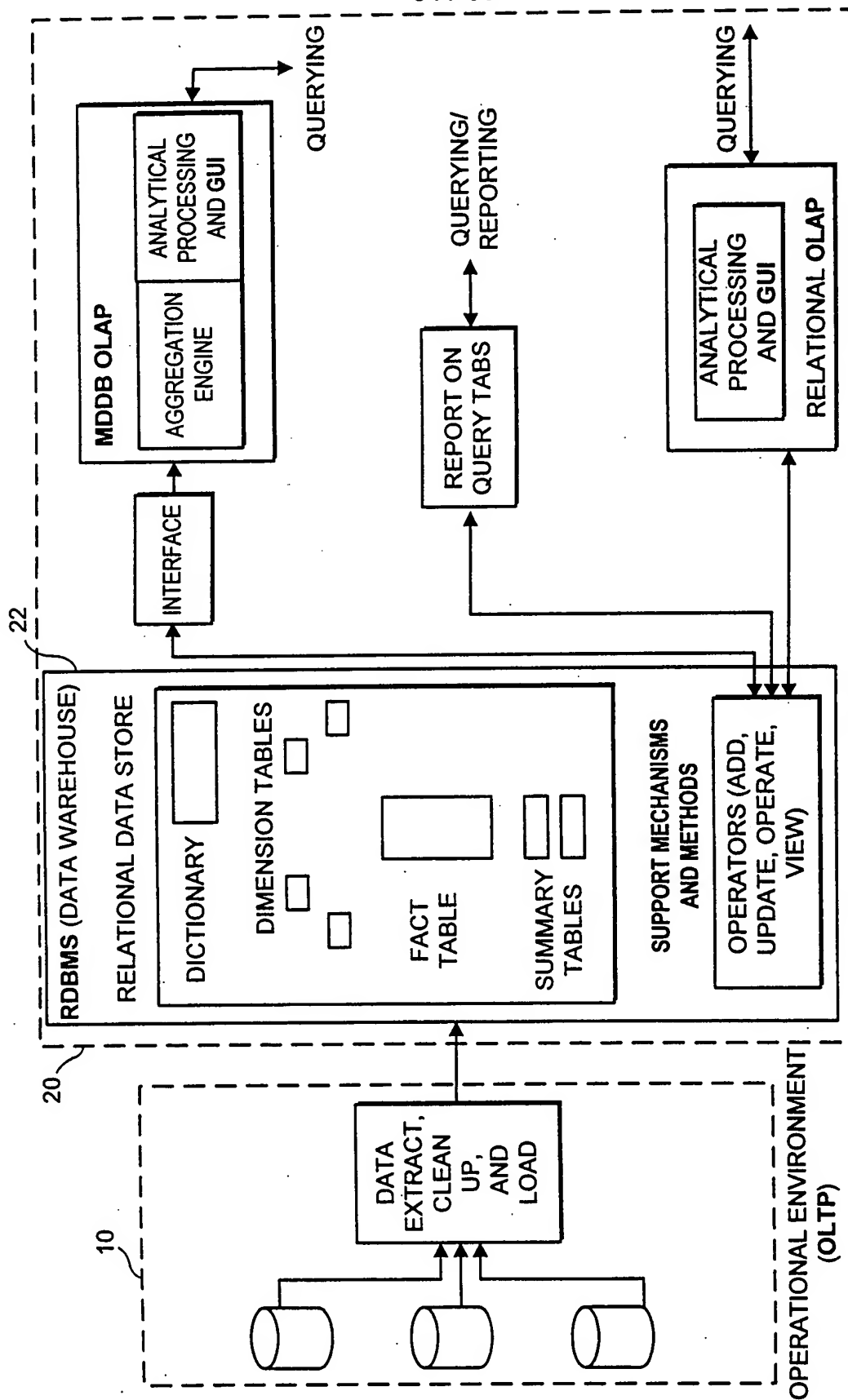


FIG. 15 (PRIOR ART)

WINE	YEAR	BOTTLES
CHARDONNAY	1996	4
FUME BLANK	1996	2
PINOT NOIR	1993	3
ZINFANDEL	1994	9

FIG. 16A

CELLAR

RESTRICT: OPERATOR:
SELECT WINE, YEAR,
BOTTLES FROM CELLAR
WHERE YEAR IS > 1995;

WINE	YEAR	BOTTLES
CHARDONNAY	1996	4
FUME BLANK	1996	2

RESULT

FIG. 16B

PROJECT: OPERATOR:
SELECT WINE, BOTTLES
FROM CELLAR;

WINE	BOTTLES
CHARDONNAY	4
FUME BLANK	2
PINOT NOIR	3
ZINFANDEL	9

RESULT

FIG. 16C

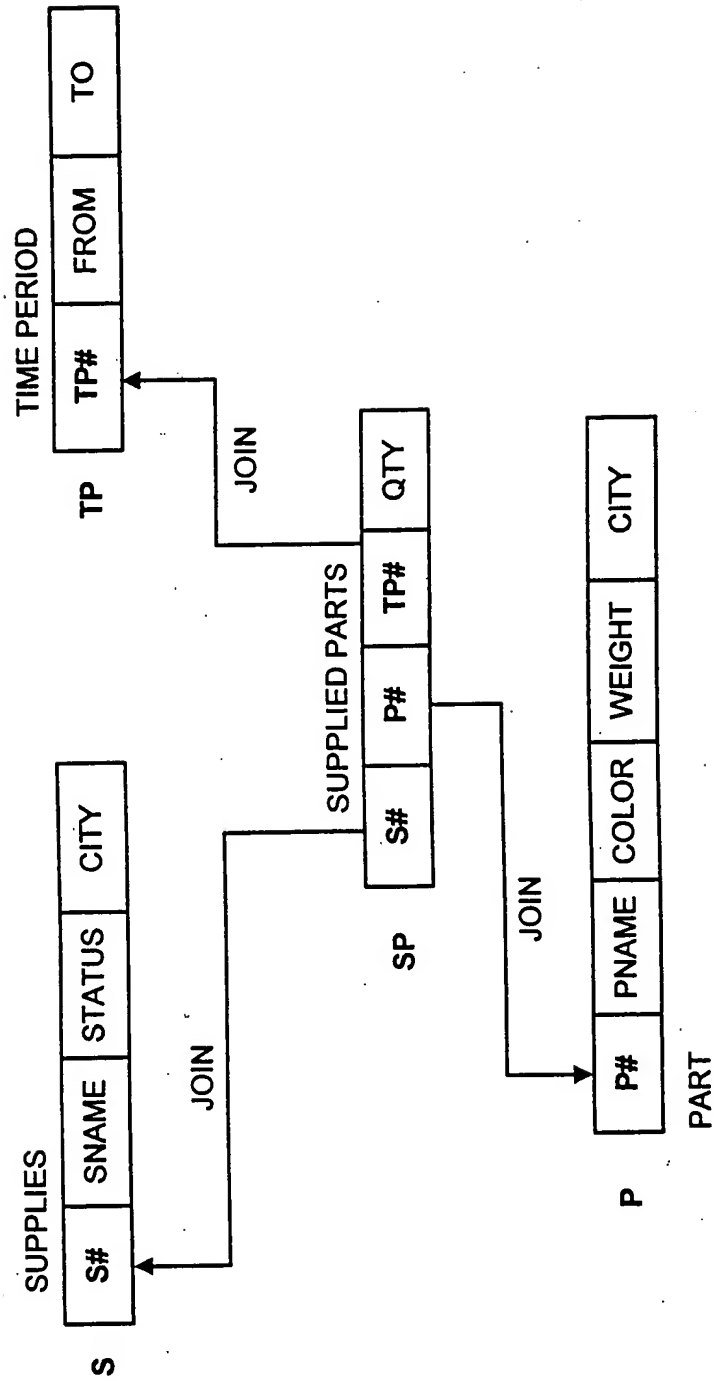


FIG. 17A

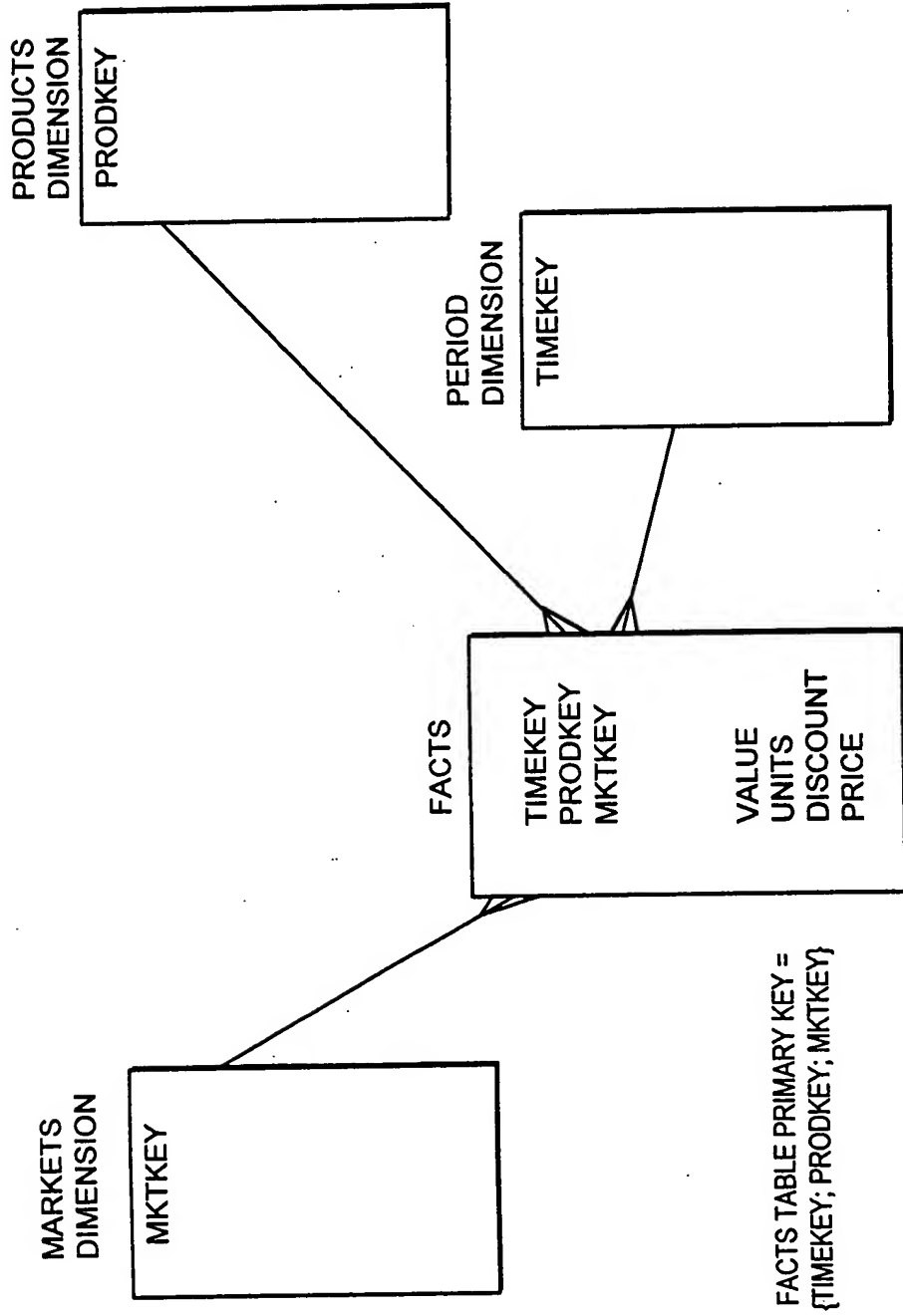
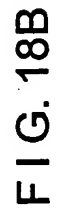


FIG. 18A



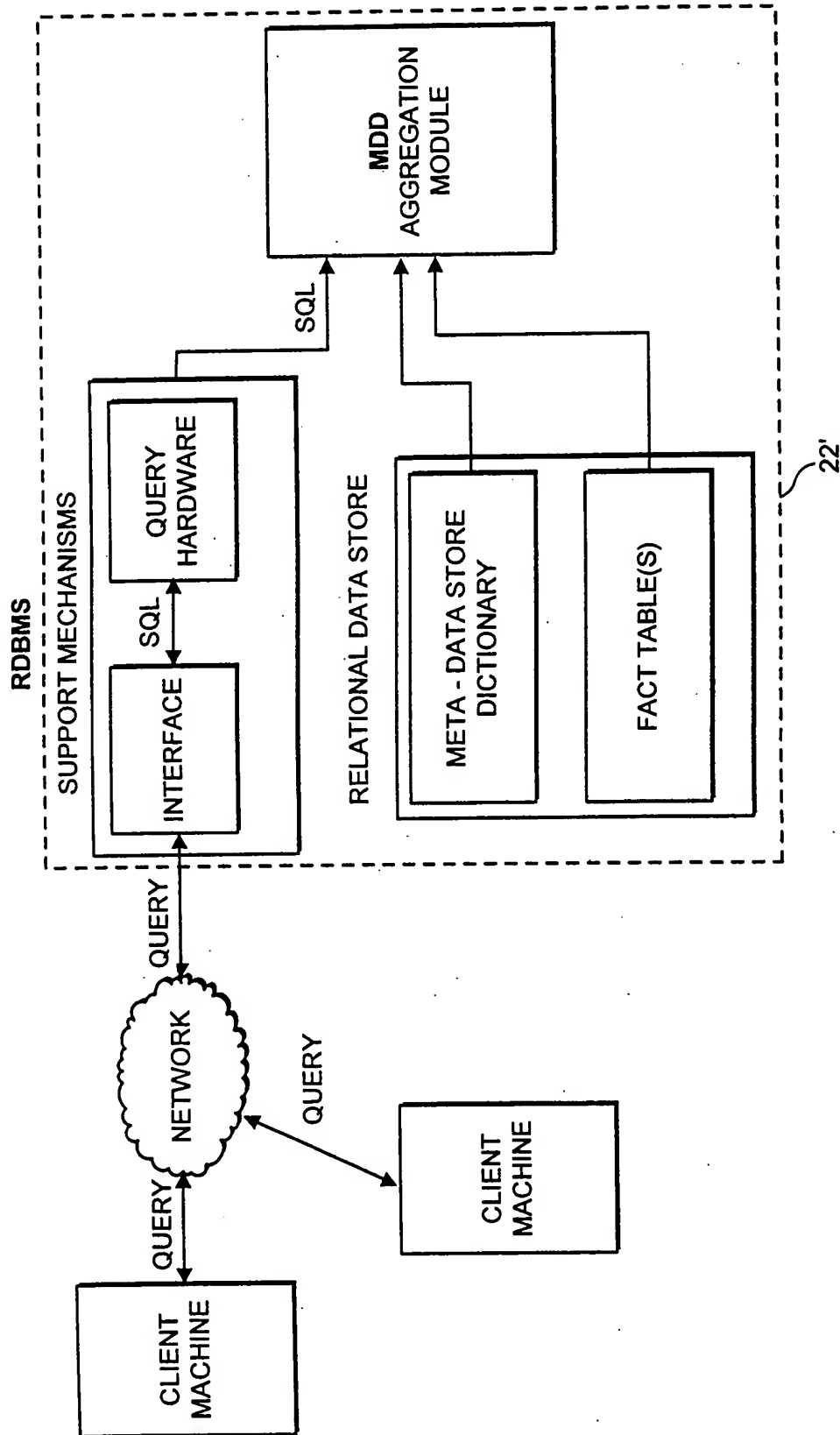


FIG. 19A

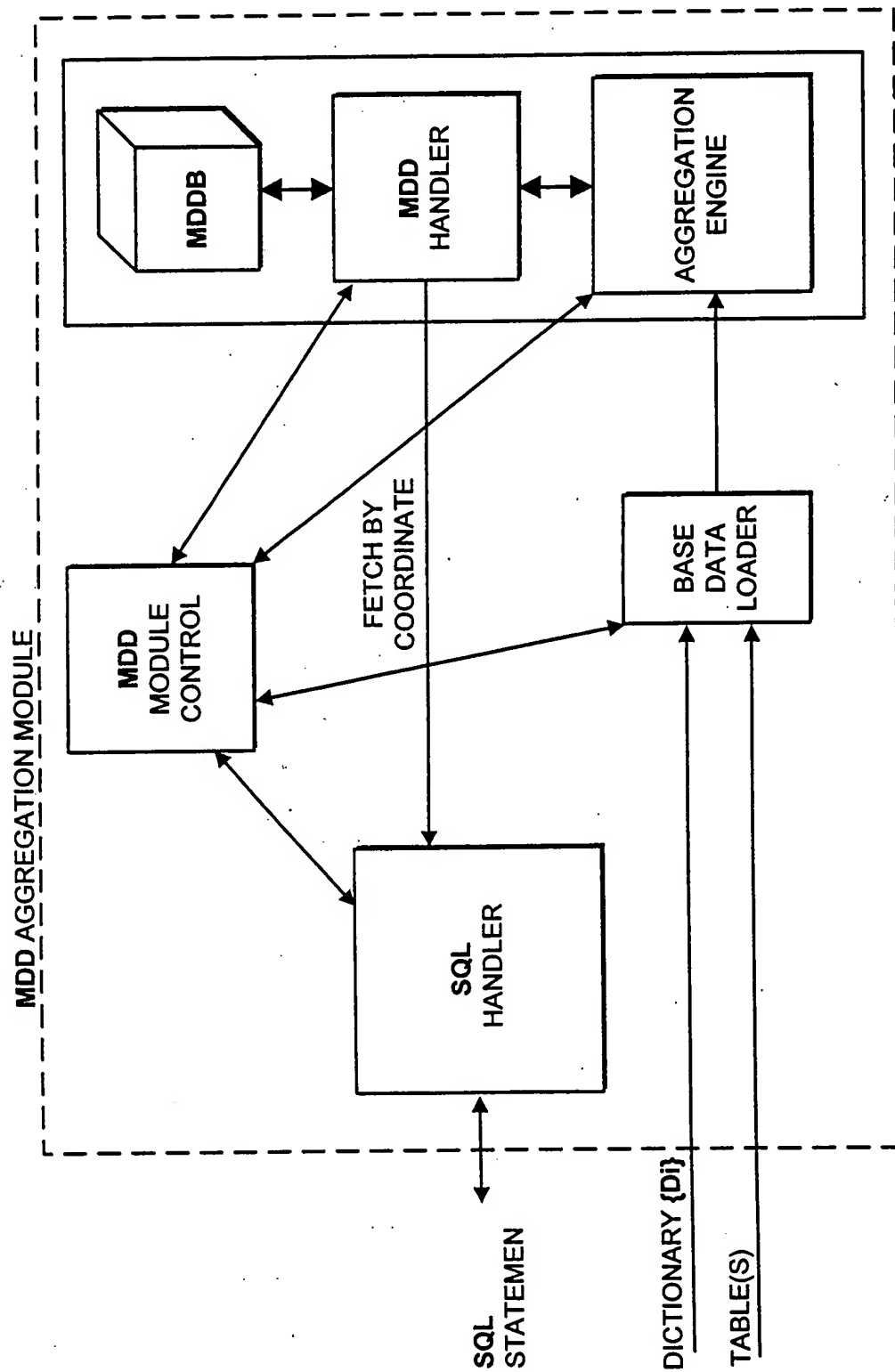


FIG. 19B

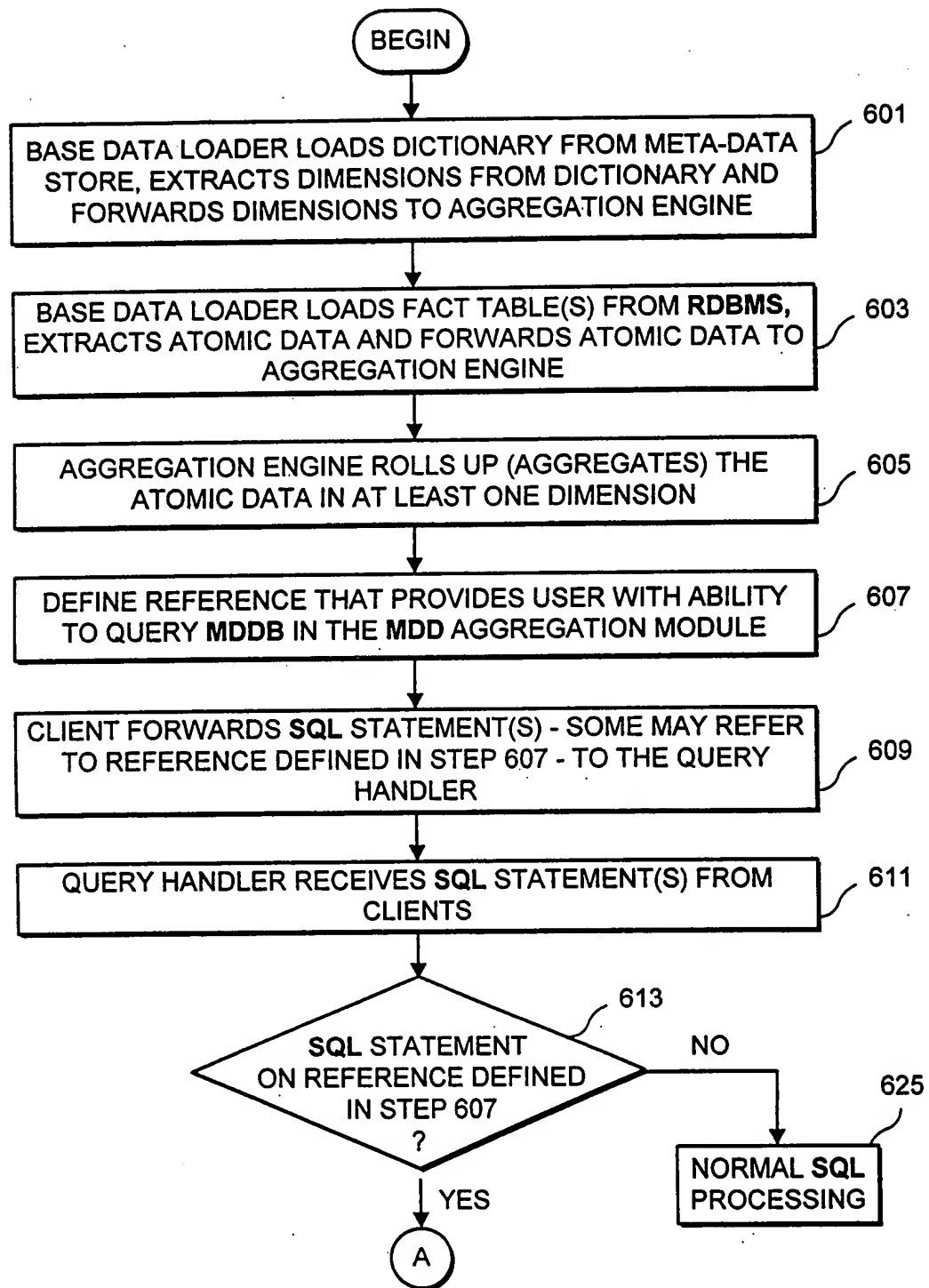


FIG. 19C(i)

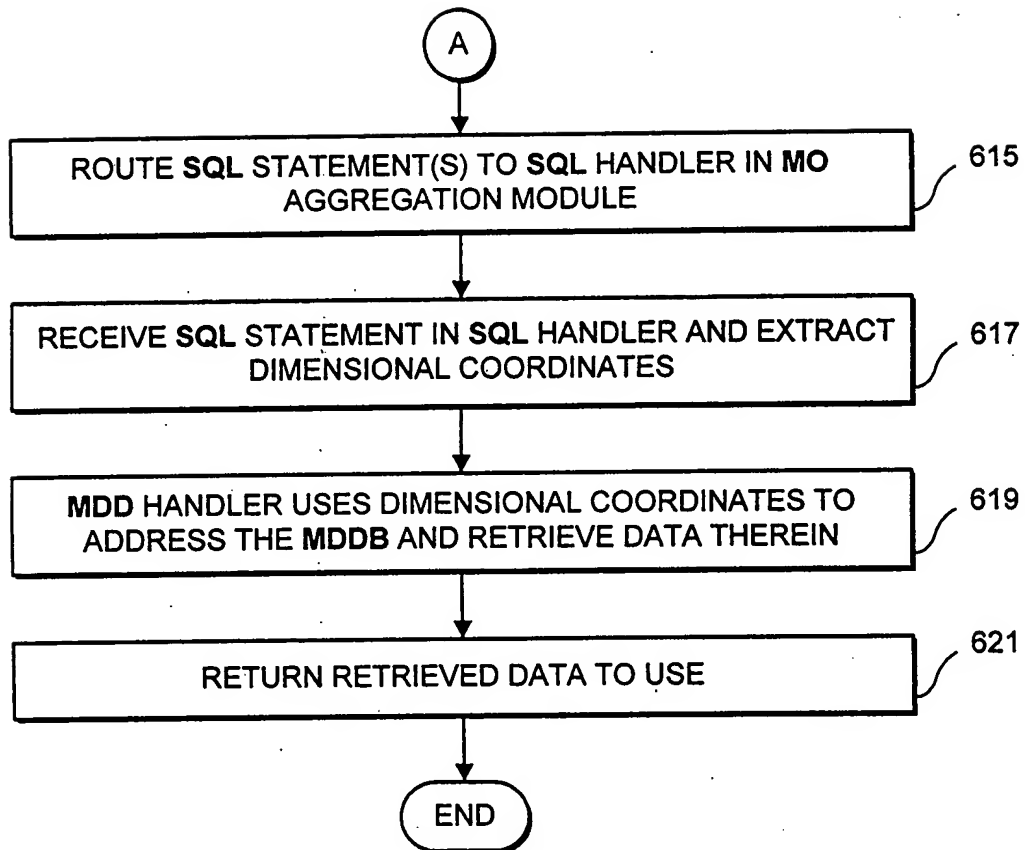


FIG. 19C(ii)

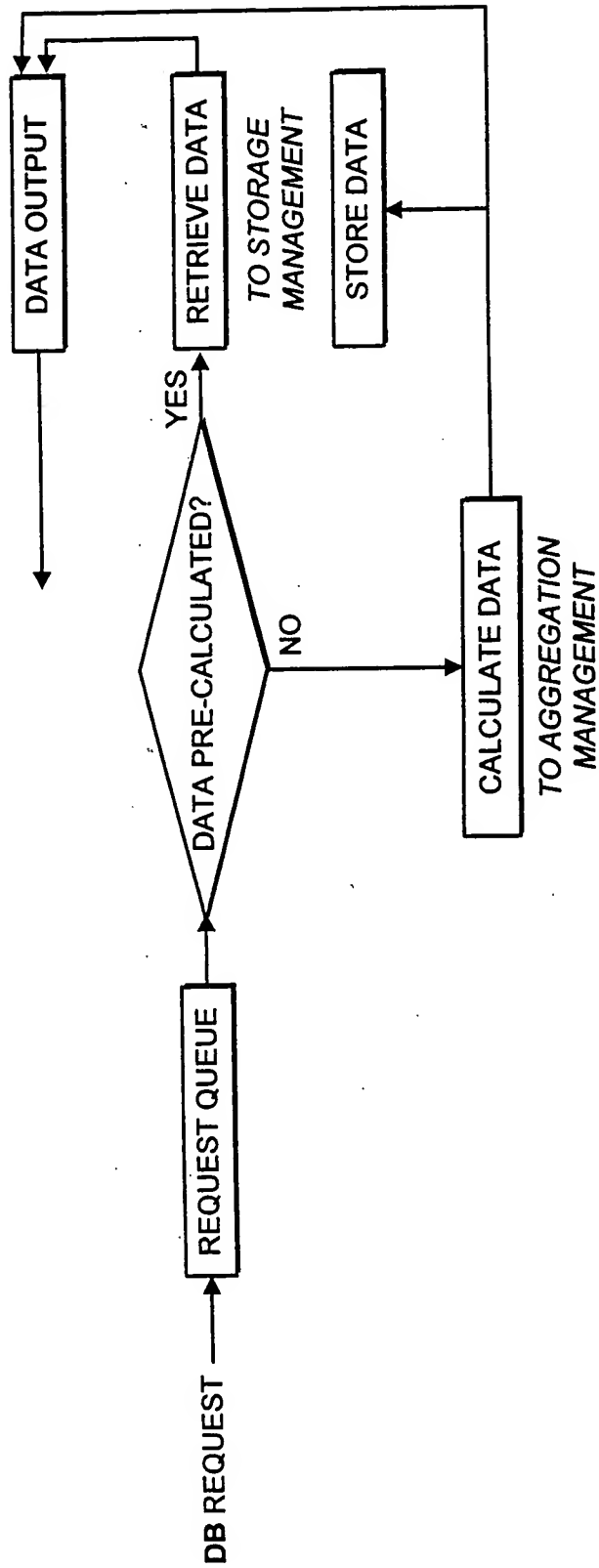


FIG. 19D

FIG. 19E is a block diagram of a system architecture for a database management system (DBMS) that supports a remote referencing mechanism. The system includes a DBMS 22, which is connected to a remote database 24. The DBMS 22 is configured to execute a remote referencing mechanism 26, which enables a view 28 to reference a remote table 30. The remote table 30 is located in a remote database 24, which is connected to the DBMS 22 via a network 32. The remote referencing mechanism 26 is implemented as a module within the DBMS 22, and it is configured to execute a CREATE VIEW statement 34 to create the view 28. The view 28 is then used to reference the remote table 30. The system is shown in a perspective view, with the DBMS 22 and the remote database 24 being represented by 3D blocks. The network 32 is represented by a dashed line. The remote referencing mechanism 26 is represented by a rectangular box. The view 28 is represented by a rectangular box. The remote table 30 is represented by a rectangular box. The CREATE VIEW statement 34 is represented by a rectangular box. The system is labeled with the reference numeral 22'.

22'

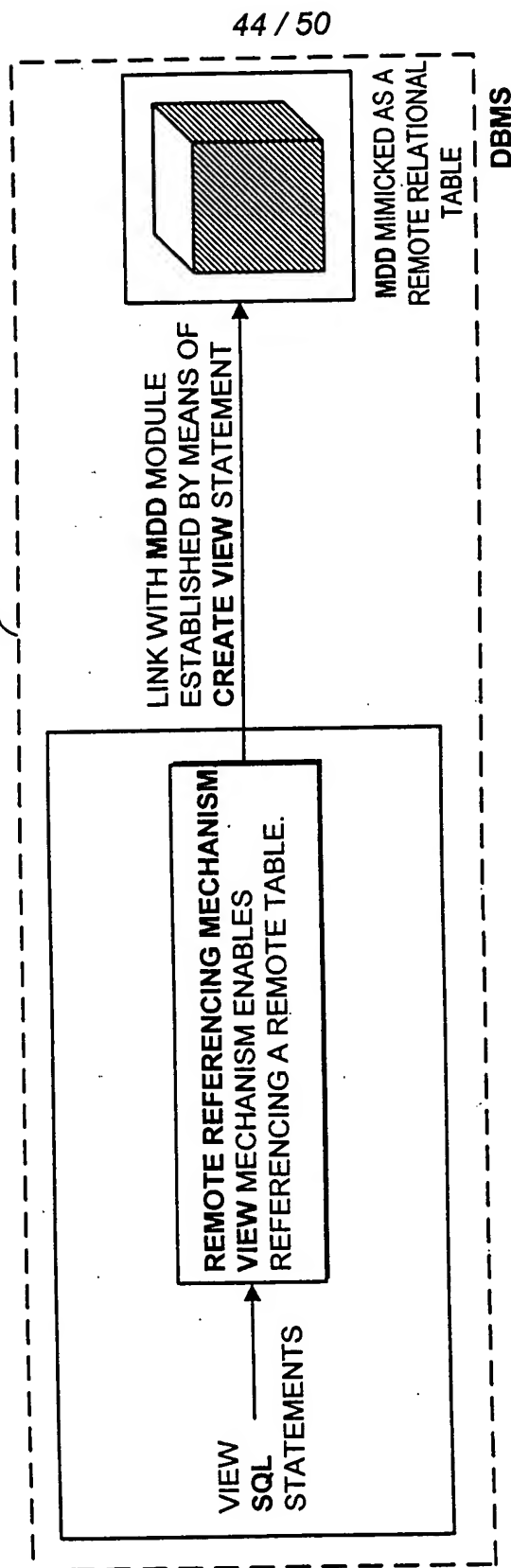


FIG. 19E

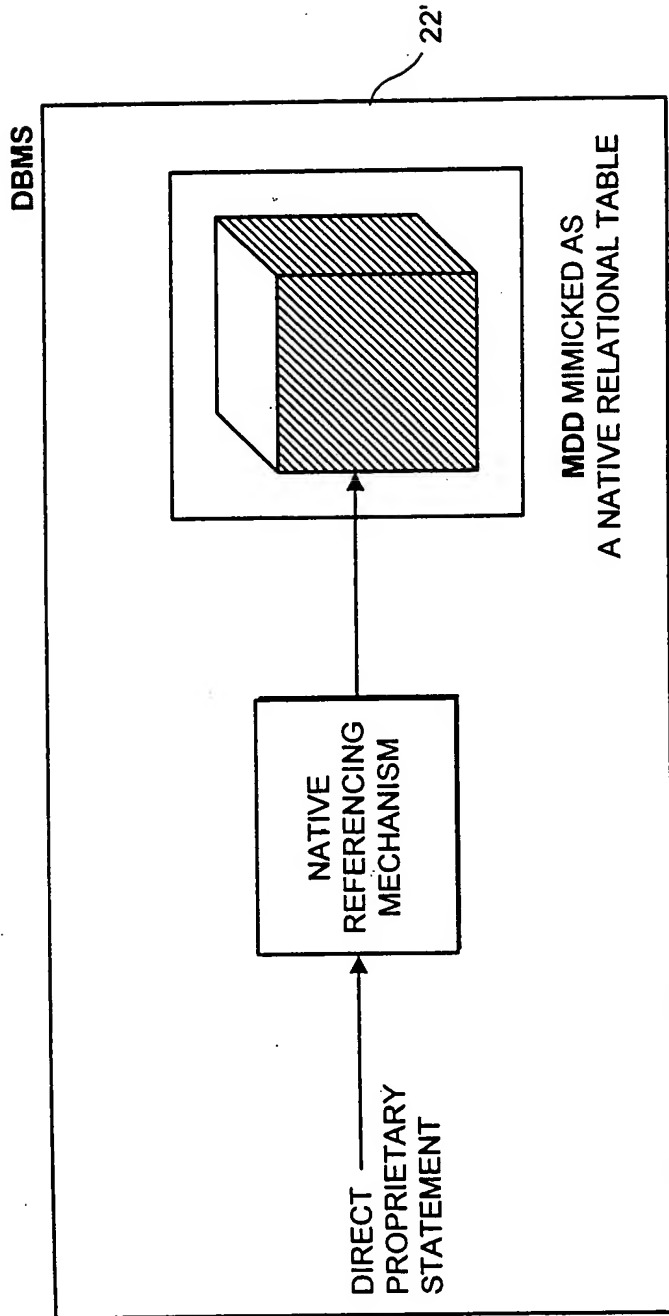


FIG. 19F

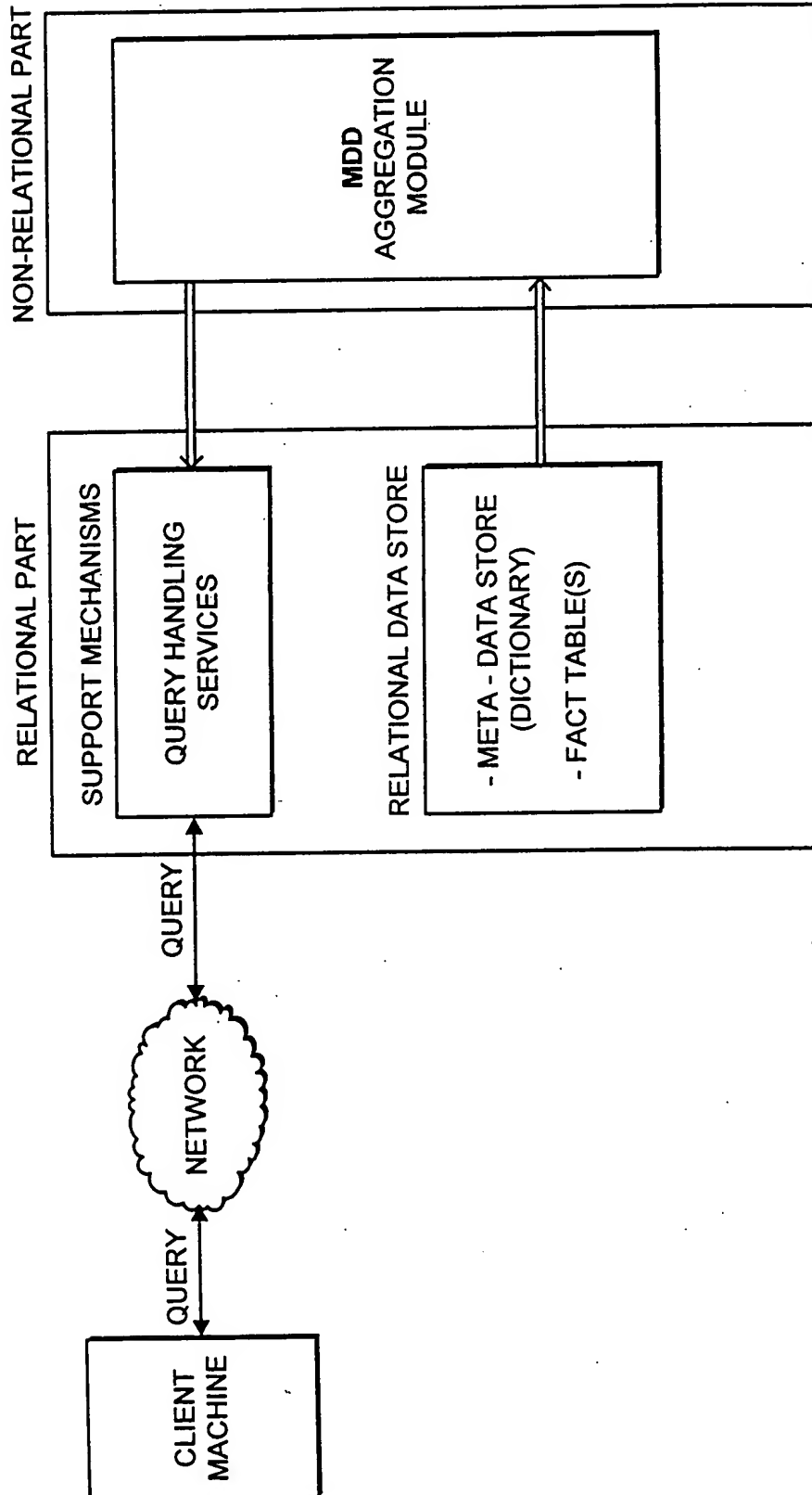


FIG. 19G

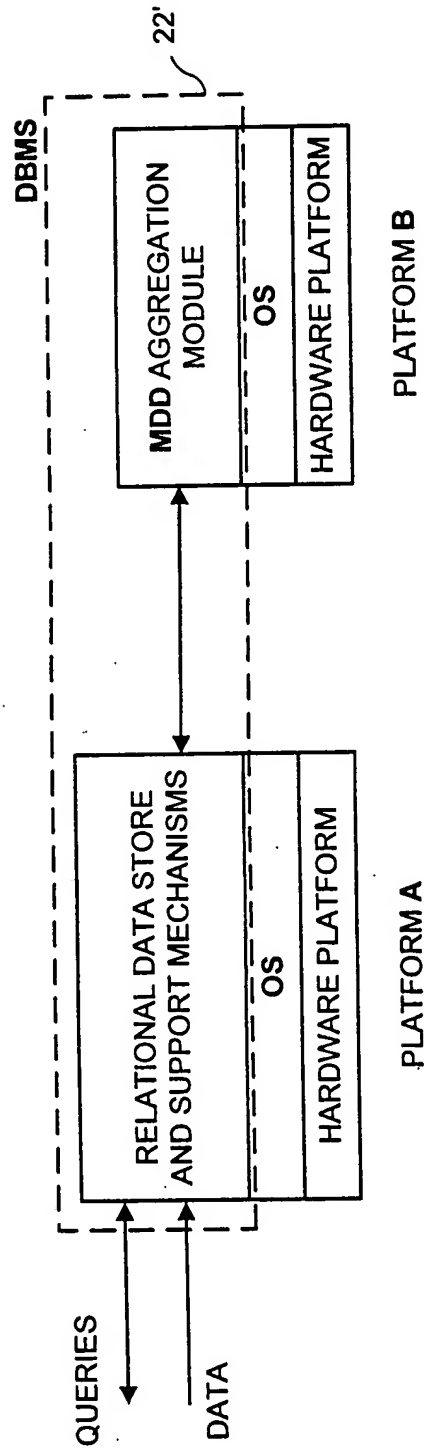


FIG. 20A

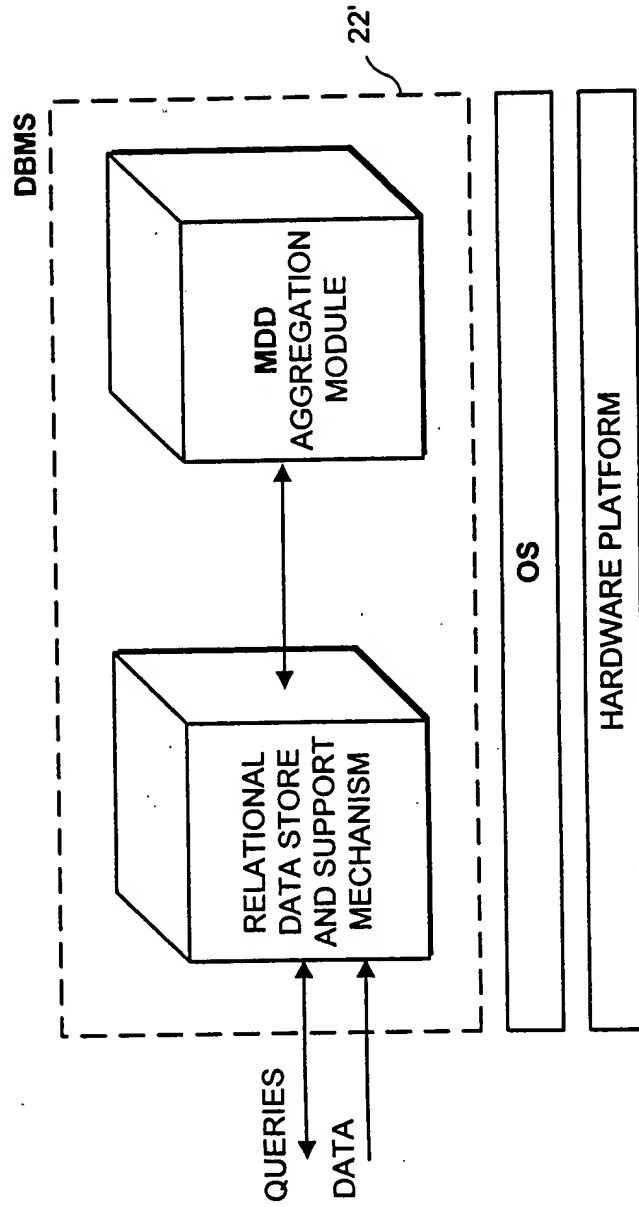


FIG. 20B

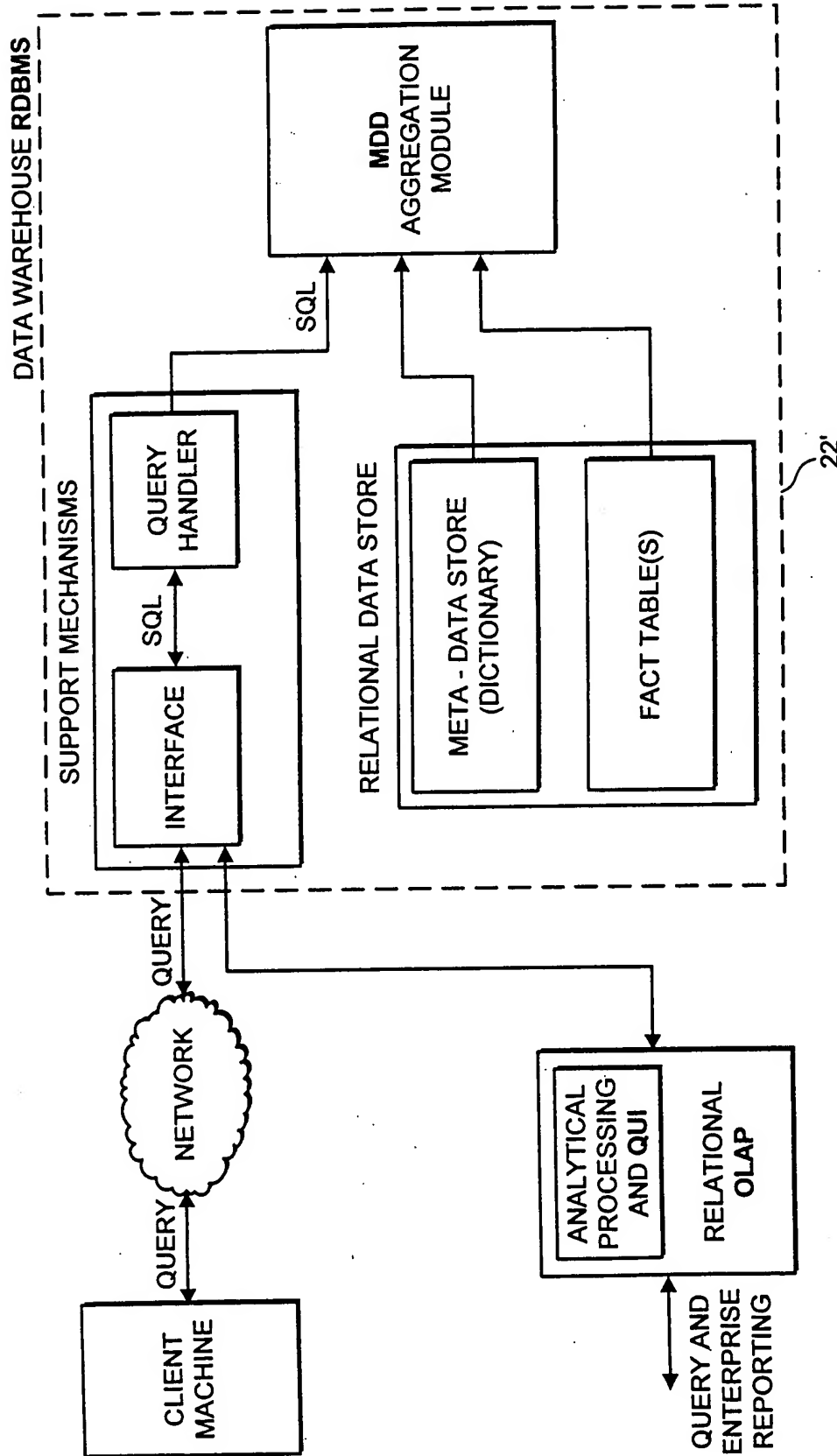


FIG. 21

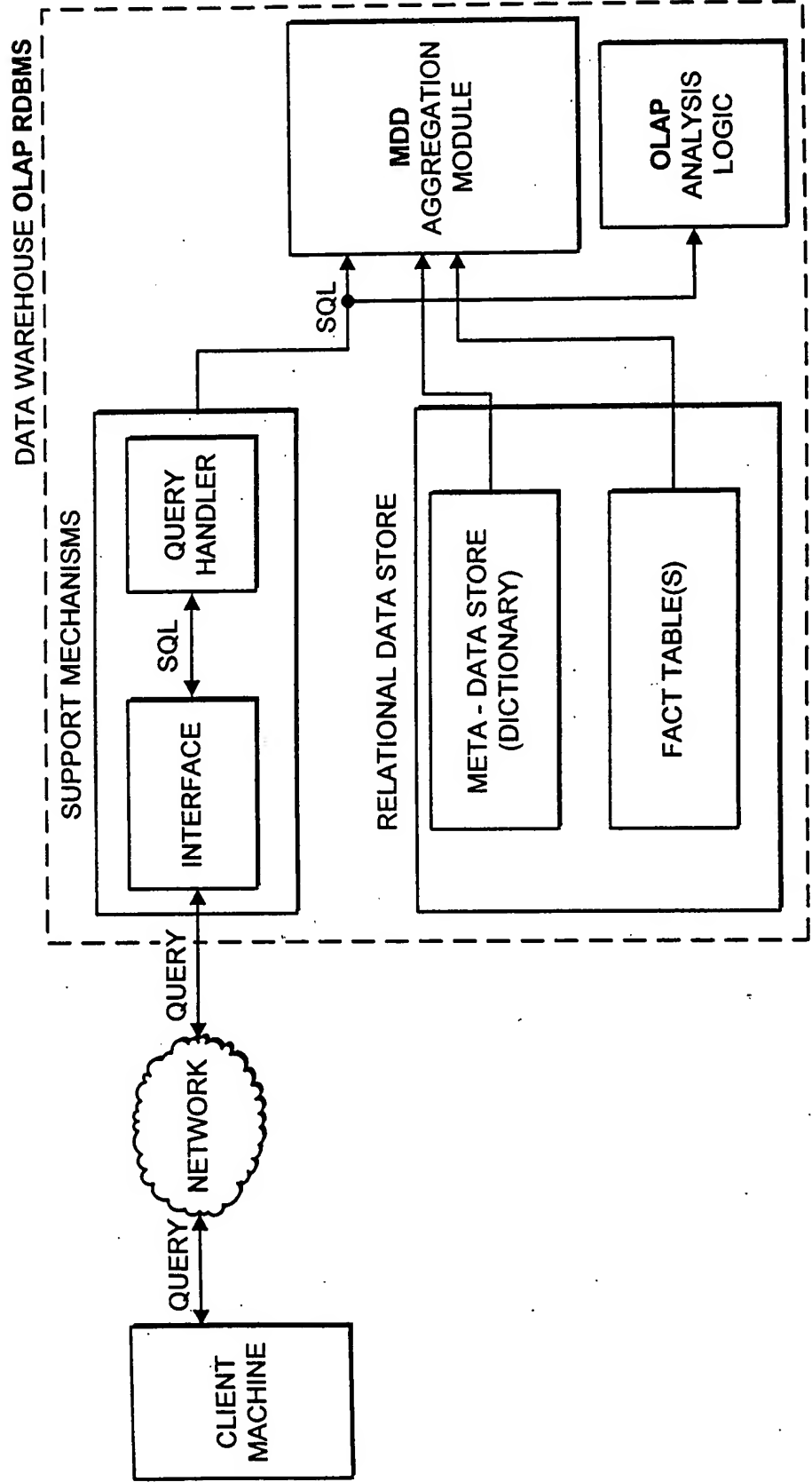


FIG. 22